News of the Industry Begins Page 996

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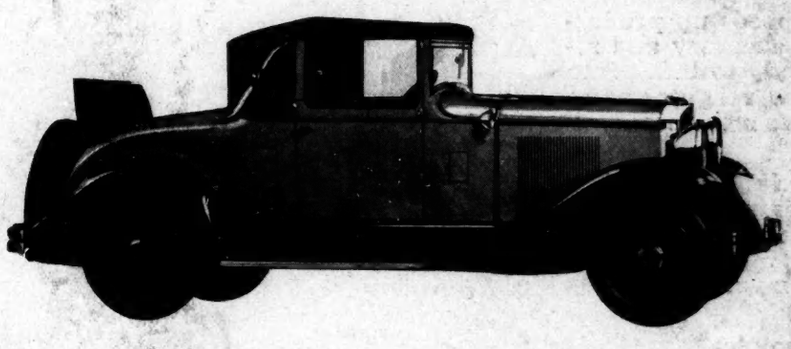

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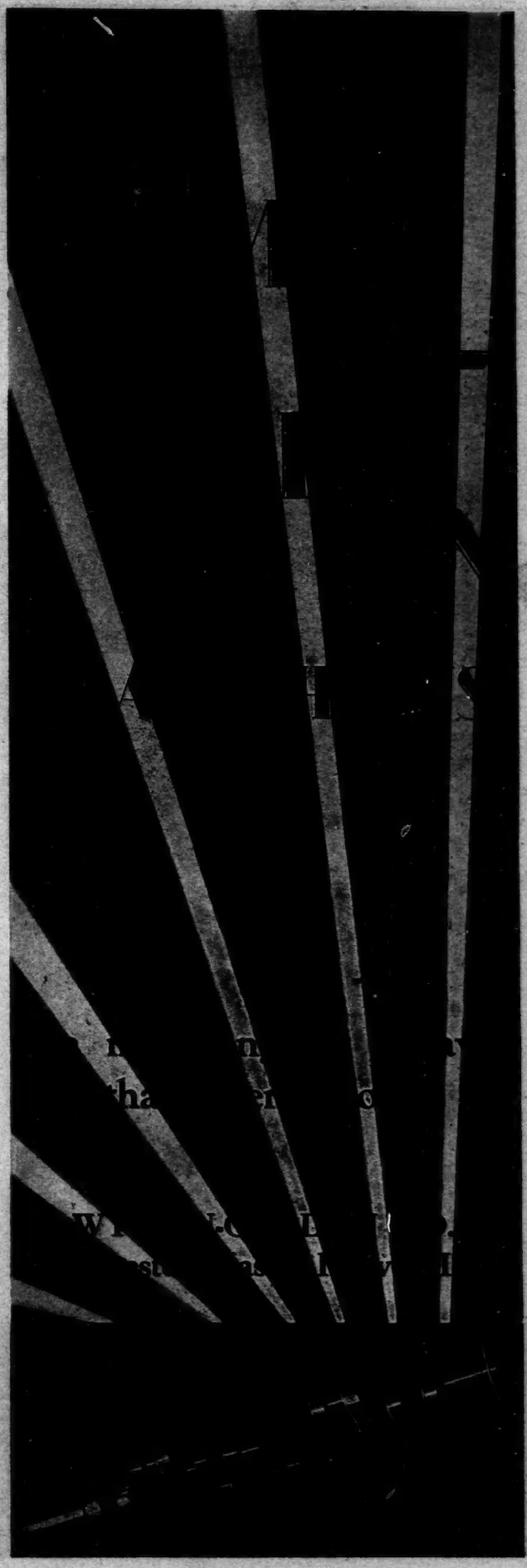

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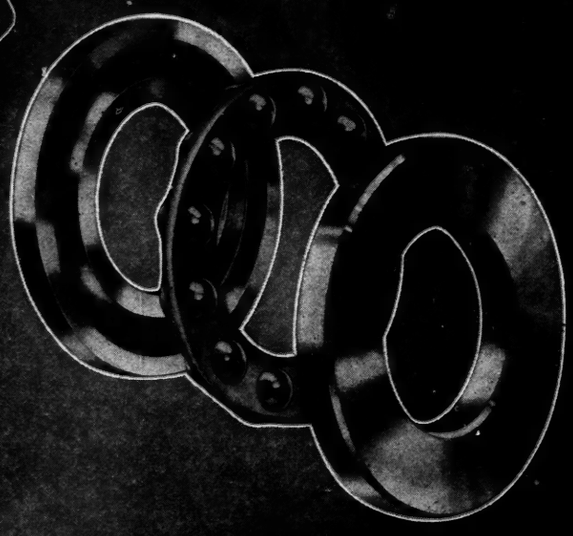

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AUTOMOTIVE INDUSTRIES

VOLUME 60 *Philadelphia, Saturday, June 29, 1929* NUMBER 26

Truck Exports Totaled 44.1 Per Cent of First Five Months' *Output*

Shipments abroad up to May 31 reached an estimated volume of 167,884 units, which, with the exception of 1928, exceeded the total of any previous year.

By GEORGE T. HOOK

Editor, Commercial Car Journal and Operation & Maintenance

ON the basis of complete reports for the first quarter of this year and carefully calculated estimates for the months of April and May, the truck industry of the United States and Canada, in the first five months of 1929, has been so successful in expanding its foreign markets as to increase its truck exports 180 per cent over the same period of 1928 and 130 per cent over 1927.

In accomplishing this the truck industry sent abroad 44.1 per cent of its total truck production for five months. Which (remembering that domestic truck sales have gone to new heights this year) answers to anyone's satisfaction the query "What is being done with the record number of trucks being produced?" Taking into consideration the domestic increases and the unprecedented position abroad, the truck industry so far in 1929 has enjoyed five of the best months in its history.

Numerically truck exports of the United States and Canada, including foreign assemblies, reached an estimated total of 167,884 in the initial five months of this year, which, with the exception of 1928, is greater than the total for any previous entire year. And in the 12 months of 1928, to give an indication of where the truck industry is headed exportly, it should be recorded that only 19,607 more trucks were shipped from American and Canadian shores than in the five-month period of 1929 already referred to.

When compared with the corresponding portions of 1928 and 1927, the 1929 export gain for five months is revealed in such gaudy percentages as 180 and 130 respectively. In the first five months of 1927 exports amounted to 72,981, and in 1928 they were 60,045.

The drop in 1928 represents the ineffectiveness of the Ford organization at the time when it was in the throes of bringing forth the Model A. Ford's emergence from its innocuous state since then is unquestionably a major factor if one seeks to account for the current high-stepping of the export market. Fortunately the prosperity, which foreign countries are in bountiful measure contributing to the American and Canadian truck industry, is being shared by every company that has been smart enough to realize that while it is engaged to the domestic market it can gain much by wooing the export field. And if individual company reports were available they would probably discover that returns are in direct proportion to effort expended.

This year commercial vehicles exported by the United States dropped $80 in unit value from the $660 figure last year. The Ford return into its own can be accounted largely responsible. The Canadian unit value remained the same at $366.

In dollar value the truck exports for the first five months of this year reached the estimated total of $71,852,720 for the United States and $8,052,000 for Canada, a grand total of $79,904,720. Parts for assembly abroad are not included in this calculation. The United States gain over the first five months of 1928 was 124 per cent, and the Canadian gain 228 per cent. Already the five-month 1929 United States and Canada truck export shipments exceed in value the entire 1927 total of $76,398,000 and the entire 1926 total of $54,036,000.

Detailed reports of the United States Department of Commerce show upon analysis that American manufacturers of trucks at last are realizing upon their labors in the South American market to a much more satisfactory degree. The reports show that in the first quarter of 1929 trucks imported by South American countries from the United States amounted to 18,699, an increase of 176 per cent over the 1928 first quarter total of 6767. Foreign assemblies,

which in 1929 increased 476 per cent over 1928, would no doubt swell the South American total, but the writer has no method by which to separate them according to countries.

Argentina, of course, leads in South America in the number of trucks imported with an increase of 180 per cent from 3221 in the first quarter of 1928 to 9018 in 1929. In numbers Brazil comes next with 5850 in 1929, a gain over the first 1928 quarter of 143 per cent. But if percentages alone are considered, the laurels must go to the little country of Uruguay, which shows a gain of 425 per cent.

The European market did not begin to hit its stride in the first quarter until March, which more than made up for a falling off in January and helped to establish with 17,607 trucks a gain of 46.5 per cent over the 12,012 in 1928.

Engineering Quality in Demand

The United Kingdom presents a case which clearly illustrates that even in a country where truck transportation is highly developed and automotive manufacturing a major industry, the American trucks demand and procure a patronage by virtue of engineering excellence, for which a premium is not exacted. In the first three months of last year, the United Kingdom imported 1598 trucks from the United States. In the same period this year 4647 were imported, an increase of 190 per cent.

Last year Australia led all other countries in the importation of trucks from this side of the Pacific Ocean. With a 130 per cent increase in this year's first quarter over that of 1928, the Antipodeans have begun the year in a manner that presages the surpassing of last year's high mark of 20,150 trucks.

Looking for reasons to which to ascribe this growing universal acceptance of American and Canadian commercial vehicles, the first to be sighted is that of quality and price resulting from standardized mass production practice. With this advantage the United States and Canada are unquestionably making inroads upon the export markets of foreign truck-producing countries, such as the United Kingdom, France and Italy. The effects of this legitimate acquisition were noticeable in the dropping off of motor exports in 1928 by those countries. With Ford more active now than last year, it is logical to suppose that foreign manufacturers this year will be sore put to hold their own.

Future of Market Unlimited

Still looking for reasons, to quality and price could be added expanded distributing facilities abroad and more intense selling and sales promotion activity, and the reasons for our export success, so far as we were directly responsible, would be exhausted. If these were the only reasons the future of our truck export market would be decidedly circumscribed. As a matter of fact, it is decidedly unlimited because in progressive foreign countries there is growing a realization—based upon experience—that truck transportation is a sound economic need, whose flexibility overcomes better than any other transportation agency many of the obstacles to be met in the development of any country which is ambitious for industrial and agricultural progress. The construction of good roads is, of course, abetting this correct belief.

If present conditions prevail, the future of the truck export market may be considered exceedingly bright. The only cloud likely to darken the United States outlook is the proposed change in tariffs. Any tariff revisions adversely affecting truck-importing countries carry with them the possibility of retaliation, in which case automotive imports stand a chance of being curtailed. This is a matter not to be lightly overlooked in view of the fact that the United States and Canadian truck industry today depends upon the foreign market to assimilate 44 per cent of its total truck production.

Comparison of Truck Exports

Gains in Principal U. S. Export Markets in First 3 Months

	1st Quarter 1929	1st Quarter 1928	Per Cent Increase in 1929
Argentina	9,018	3,221	189
Australia	6,682	2,898	130
Brazil	5,850	2,403	143
United Kingdom	4,647	1,598	190
Spain	3,156,	1,121	181
British India	2,060	692	198
Uruguay	1,566	298	425
Union South Africa	1,536	916	78
Philippines	1,190	345	245
Egypt	880	533	65
France	610	240	154

Percentage of Truck Output Exported by U. S. and Canada

First Five Months	Exports, Incl. Foreign Assemblies	Total Truck Production	Per Cent of Production Exported
1929	167,884	380,657	44.1
1928	60,045	209,428	28.6
1927	72,981	241,492	30.2

U. S. Export Gain by Capacities

(Not including foreign assemblies)

Capacity	Three Months 1929	Three Months 1928	Per Cent Gain
Up to 1 ton	44,306	24,066	84
Over 1-2½ tons	12,739	5,633	126
Over 2½ tons	1,028	726	41

U. S. and Canada Exports by Months

(Including foreign assemblies)

	1929	1928	1927
Jan.	21,079	13,999	11,776
Feb.	27,157	11,255	14,041
Mar.	35,560	11,756	15,838
Apr.	43,416	10,936	15,795
May	40,672	12,099	15,531
	167,884	60,045	72,981

1929 shows 180 per cent gain over 1928 and 130 per cent over 1927

Value of Trucks Exported in first 5 Months

(Not including foreign assemblies)

Five Months 1929	No. Vehicles Exported	Unit Value	Export Value	Per Cent Gain Over 1928
United States	123,884	$580	$71,852,720	124
Canada	22,000	366	8,052,000	228

Five Months 1928	No. Vehicles Exported	Unit Value	Export Value
United States	48,528	$660	$32,028,480
Canada	6,703	366	2,453,298

U. S. Foreign Assemblies

	1929	1928	1927
Jan.	4,614	638	1,582
Feb.	4,055	847	2,028
Mar.	5,213	952	2,543
Apr.	7,164	1,159	2,637
May	6,711	1,218	3,196
Five months	27,757	4,814	11,986

476 per cent increase in 1929 over 1928 and 131 per cent over 1927

Hudson Offers Dover ¾-Ton Express Priced From $835 to $895 F. O. B.

Most of the replacement parts for the six-cylinder engine are interchangeable with those of the Essex Super Six. Four commercial bodies are available.

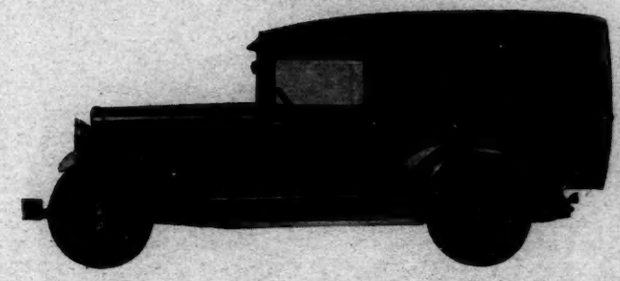
THE entry of the Hudson Motor Car Co. into the light truck field, stated to be impending in these columns some time ago, has become a fact with the announcement of the "Dover," a ¾-ton commercial car in four body types. The chassis list price is $595, while the prices of complete vehicles are as follows:

Open Express	$835
Canopy Express	870
Canopy Screen Express	885
Panel Express	895

The new Dover is featured by a six-cylinder, relatively high-speed engine, to provide economical operation and ample power reserve. Exteriors, as will be noted from the illustrations, are quite striking, with an especially pleasing front end treatment, similar in general lines to the Hudson and Essex passenger cars.

View of the Hudson Motor Car Co.'s Dover ¾-ton canopy express

The engine has a bore and stroke of 2¾ by 4½ in., giving a piston displacement of 160.3 cu. in. It develops 55 hp. at 3600 r.p.m. Most of the engine replacement parts are interchangeable with those of the Essex Super Six. This keeps down dealers' stocks of parts and minimizes the cost of servicing.



Panel express body of Dover commercial car

Lubrication is of the combination pump and splash type, as on the Hudson, while thermo-syphon cooling is assisted by a large radiator equipped with manually controlled shutters. Other mechanical details include a single-plate clutch, three-speed standard shift transmission in unit with the engine, semi-floating rear axle and two-shoe four-wheel Bendix brakes. Semi-elliptic springs all around are mounted in Tryon shackles, the eight-leaved front springs being 36 in., and the 12-leaved rear springs 53 in. long. The parking brake operates on all four wheels, the same as the foot brake, and on the same drums.

Equipment includes, in addition to the usual instruments, an engine thermometer on the dash and a combination gasoline and oil level dash gage as on the Hudson and Essex passenger cars, both being electrically operated on the same indicator, on depressing and releasing a dash switch. There are also provided an Electrolock, an AC air cleaner, two-filament headlights, a spare tire well on the right front fender, an extra rim with tire lock, and curtains for the screen and canopy express at no extra cost.

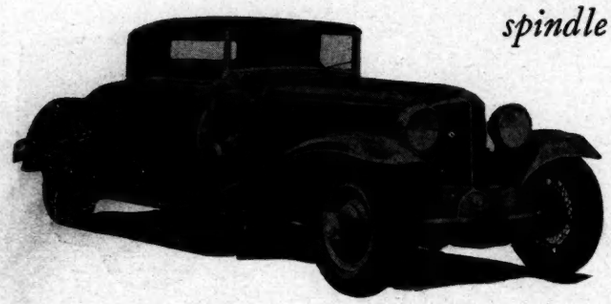
Major Specifications of Dover Truck

Name	Dover	Oil capacity	6 qts.
Capacity	¾ ton	capacity, refill	5 qts.
Wheelbase	110½ in.	Cooling	Thermo-syphon
Tires, front	30 x 5.00 balloon	Water capacity	19 qts.
Tires, rear	31 x 5.50 balloon	Radiator shutters	manual
Engine	6-cyl. L-head	Fuel feed	vacuum with booster
Bore and stroke	2¾ x 4½ in.	Gas tank capacity	11½ gal.
Piston displacement	160 cu. in.	Carburetor	Marvel air valve
Max. hp.	55@3600 r.p.m.	Air cleaner	AC
Suspension	4-point rubber	Electrical units	Auto-Lite
Pistons	Al. alloy	Ignition	automatic
Crankshaft	3-bearing	Starter	Bendix
Counterbalanced	yes	Starter control	on dash
Camshaft	chain-driven	Clutch	single-plate
Chain adjustment	generator	Facings	cork inserts
Lubrication	splash		

Transmission	3-speed
Rear axle	½ floating
Final drive	spiral bevel
Brakes	4-wheel
Type	2-shoe Bendix
Drum diameter	11 x 1½ in.
Parking brake	4-wheel
Springs	½ elliptic
Front spring	36 x 2
Rear springs	53⅞ x 2
Frame	pressed steel
Crossmembers	5
Channel depth	8 in.
Steering gear	Gemmer
Propeller shaft	Spicer

Auburn Announces Front-Wheel *Designed* Around *Miller Patents*

Two closely spaced and directly opposed universal joints at the outer ends of the driveshafts assure constant wheel spindle velocity at all steering angles



Pictured above is the Cord cabriolet which will be priced at around $3,000. Note the distinctive front end treatment

By ATHEL F. DENHAM

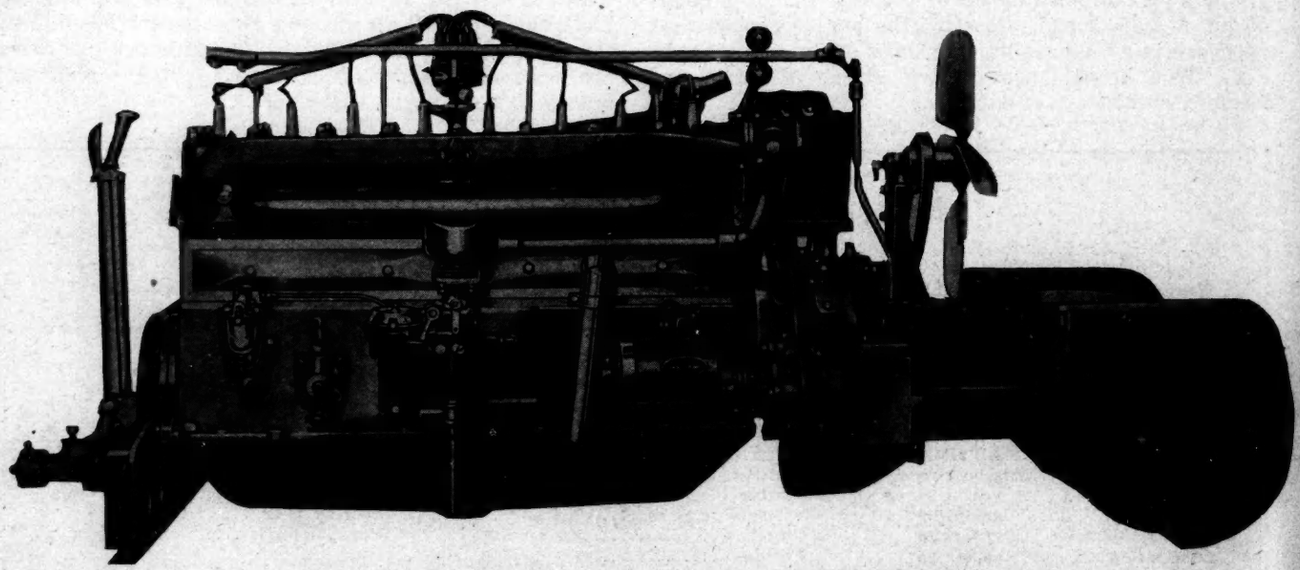
THE "Cord" front-drive passenger car is announced by the Auburn Automobile Company. Named after this company's president, E. L. Cord, it represents one of the most outstanding developments in passenger car design in many years, not only because it is a front-drive car, but also because in it are combined departures from accepted practice (without resorting to radicalism) which set the car apart as not "just another automobile." This is probably best emphasized by the body, which, while conforming to modern accepted standards of beauty, evinces just enough of the unusual to make its appearance one of distinct individuality.

Quantity production has already begun at the Auburn, Indiana, plant of the company.

The announcement follows rumors that have shuttled throughout the industry for several months that Auburn was to bring out a front-drive line of passenger automobiles designed around the Harry Miller patents and to take the lead in making available to the public the front drive principle.

Many unconventional features are evident in the new car, which has been under tests and experimentation for more than two years. The sharp-angled false front of the radiator is something new to American cars. The front fenders are longer and more sweeping than those found on other production automobiles. They are in keeping with the exceptionally long and tapering hood which houses the driving units of the car. The usual deep trough between the fender apron and the hood has been made much shallower. The bodies extend out to the running board, with practically no splash guard ledge ahead of the front door.

While the bodies are some 10 in. lower than those on comparable rear-wheel drive automobiles, there is ample head room and the doors are sufficiently high to permit reasonable ease of ingress and egress, especially in the sedan. The combination of these features, of



Right side of the powerplant and front drive assembly of the Cord, showing the engine, transmission, differential and front brake drums, before being placed in the chassis frame

Drive "*Cord*"

E. L. Cord, president of the Auburn Automobile Co.

course, is peculiar to the front wheel drive car with its low frame, having no kick-up over the rear axle. The latter unit is merely a member on which to mount the rear wheels and their brakes, and thus is similar to a front axle without steering knuckles.

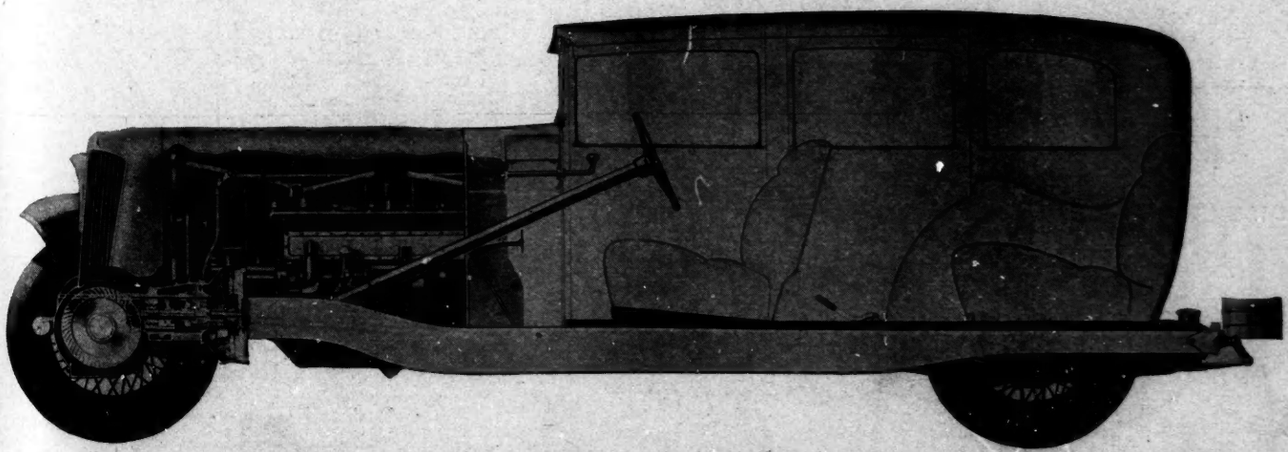
Being a front-wheel-drive car, all power transmission units are located ahead of the dash, with the general order reversed. Thus the engine is of nearly normal eight-cylinder design turned around, with the flywheel housing at the front. The next unit forward is the clutch, then the transmission, and the differential, all of these being bolted together in a unit powerplant.

From the differential, power is transmitted to the wheels by means of universally jointed driveshafts, the wheels themselves being pivoted to a tubular dead axle which is bowed forward in an arc to clear the driveshafts and differential housing. Both drive and torque reaction are taken through the front springs, these being of the double ¼ elliptic type, with one spring above, and one mounted below, the frame side channel.

The entire design obviously reduces the unsprung weight, which is reflected in better riding qualities. Moreover, the car weight with gas tank full is exceptionally well balanced, there being only about 10 to 20 more pounds on the front than on the rear wheels. Further, the exceptionally sturdy frame construction, made possible by the elimination of the rear axle kick-up and the unconventional bracing, enables the use of lighter bodies, the total weight of the four-door sedan, with its 137⅝ in. wheelbase, being only about 3975 lb. In addition to the sedan, there are offered a cabriolet, a phaeton sedan and a brougham. The base price probably will be in the neighborhood of $3,000.

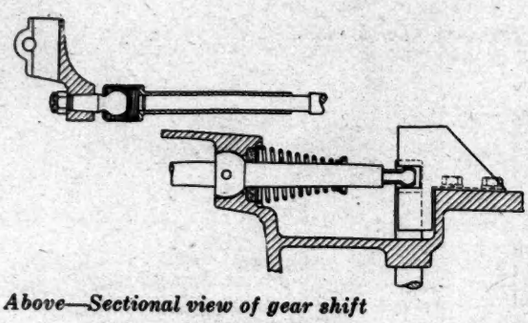
Taking the units individually, the engine design has been based on that of the Lycoming straight eight used in the Auburn 120 chassis. It has the same pistons, connecting rods, valves and cylinder block as the latter, but has a new crankshaft, camshaft, cylinder head, oil pan and accessories drive. The engine being turned around with the front cylinder at the rear, the chain drive for the camshaft has been removed to the more accessible front end. This chain has an automatic idler adjustment also. The crankshaft in addition is fully counterweighted and the design includes a Lanchester damper.

Cylinder heads, which are of the Janeway type, as on the latest Auburn eights, are reversed to maintain the water outlet riser at the front end. Attached in the usual manner to the cylinder block is a three-speed transmission, which differs from the conventional mainly

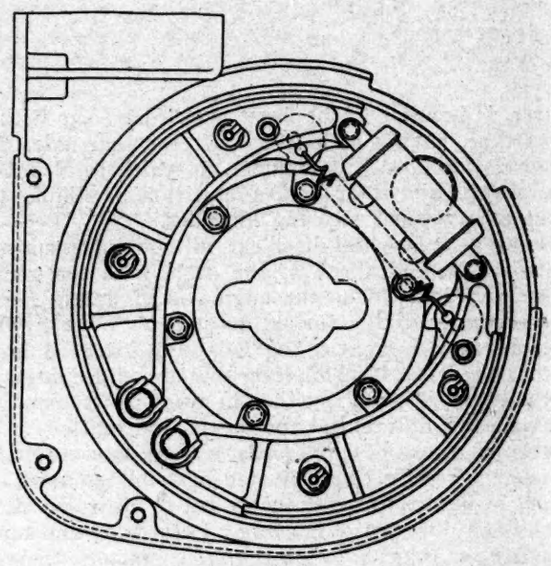


Phantom view of the Cord closed car. Note the straight rear frame construction and the seating positions of the same height, made possible by the elimination of the rear axle kick-up through the forward drive mechanism. The gear shift lever projects through the dash near the steering wheel

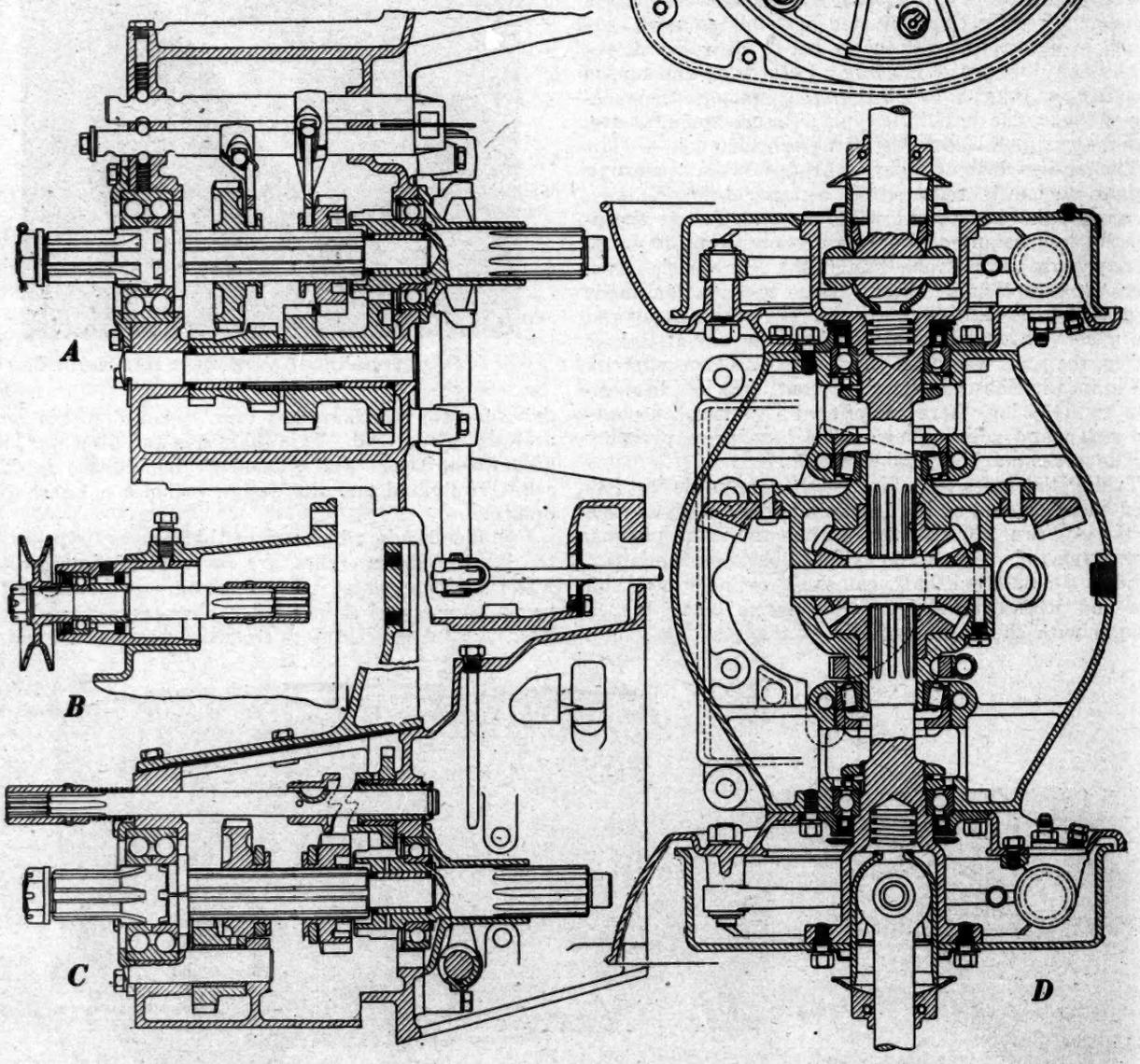
Detailed Drawings of Transmission of Cord Front-Drive Car



Above—Sectional view of gear shift



Right—Plan drawing of internal details of brake

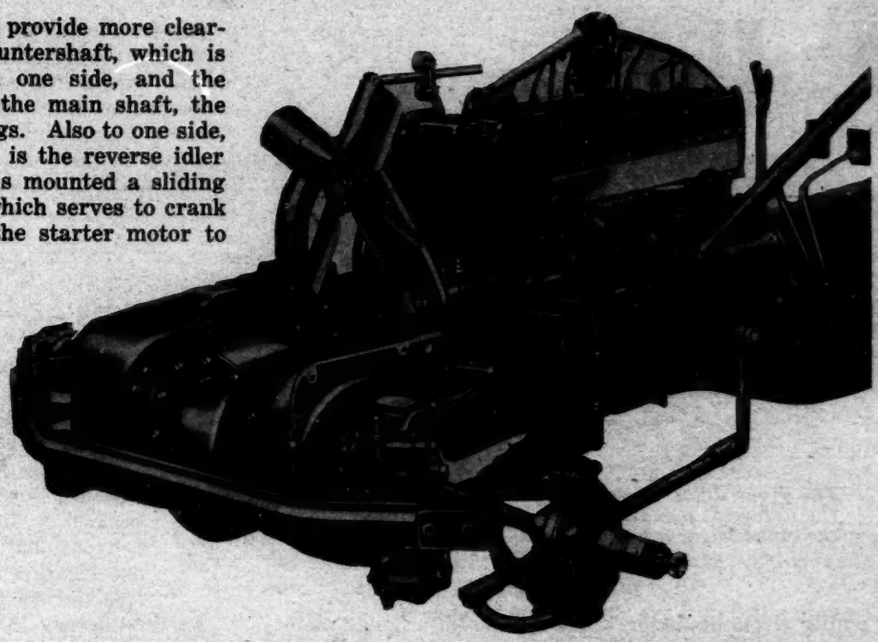


Cross-section drawings of top and side views of transmission (A and C). The small drawing B shows the shaft extension for fan drive. The drawing D is a detailed plan of the differential, showing the connection of driveshafts through their universal joints

in that it is turned on its side to provide more clearance below the case. Thus the countershaft, which is of the roller bearing type, is on one side, and the shifter rods on the other side of the main shaft, the latter being mounted in ball bearings. Also to one side, and slightly below the main shaft, is the reverse idler gear, while above the main shaft is mounted a sliding shaft provided with a dog clutch which serves to crank the engine in case of failure of the starter motor to function.

Since the engine now turns counter-clockwise, and this shaft is geared to the transmission main shaft, the actual cranking operation is clockwise, as on rear wheel drive engine design. The shaft for cranking the engine is splined at its forward end into an extension mounted in the differential housing, at the forward end of which the crank handle can be inserted.

The double row ball bearing at the forward end of the transmission main shaft also serves as the pinion shaft bearing, since the pinion is mounted directly on an extension of the transmission main shaft projecting into the differential case. The latter is bolted to the transmission housing and frame. Unusually heavy pinion and ring gears are used for the hypoid final drive, with the pinion offset 2 in. upward from the centerline of the ring gear. Differential gears are of fairly normal type, with the side gears internally splined. The differential assembly is mounted on Timken bearings.

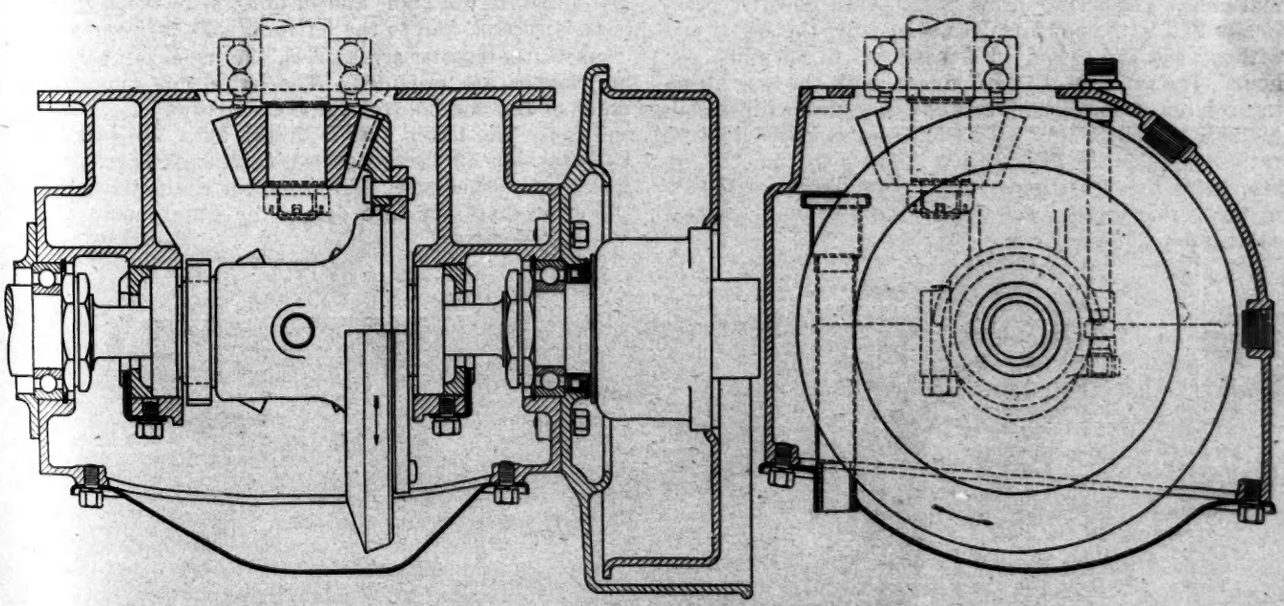


Three-quarters view of the Cord unit powerplant and front suspension system, in which are included the engine, transmission, differential and brake drums. The steering universal joints and front axle are worthy of note. The car has centerpoint steering

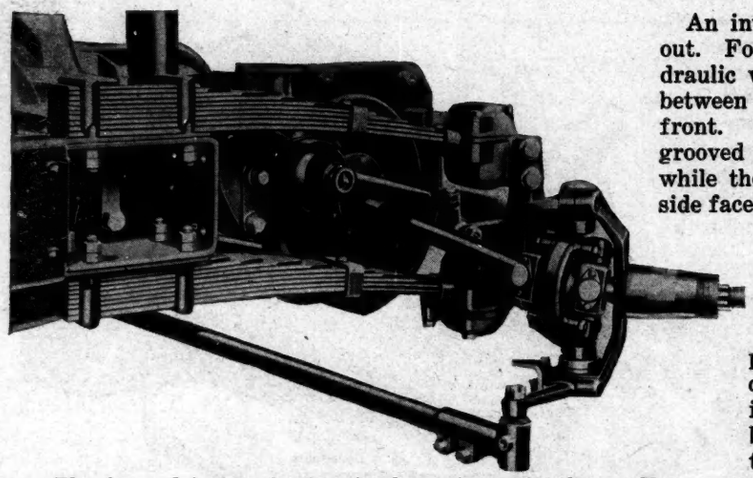
Integral with the short splined shaft and mating with the side gears are grooved drums in which are carried Universal Products universal joints, the grooves enabling the joint to slide in and out, in order to provide for varying distances from the differential to the wheels with changing wheel position due to spring deflection.

The driveshafts have an unusual universal joint construction at the outer ends, consisting basically of two universal joints at 180 deg. to each other. A single universal joint, of course, does not have uniform angular motion with angular deflection of the shafts, but has an harmonic motion. The use of two directly opposed universals balance out the two harmonic motions, giving constant velocity to the wheel spindles. In order to maintain the amplitude of the harmonic motion identical for the two joints, they are attached to a ring between them in such a manner that the ring at all times bisects the angle between the universals, rotating in one plane for any given wheel spindle position. Moreover, the universals are connected by a ball joint in the center of the ring, so that the wheel spindle and driveshaft center lines will always intersect, as otherwise erratic motion would be produced.

This design of the outer universal assembly has produced the additional advantage of an unusually small



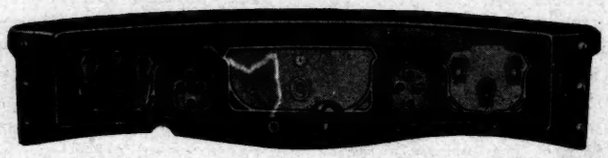
Sectioned drawing of pinion and ring gear mechanism. To the right is the side elevation of the same unit



The front drive mechanism is shown in section here. Note the universal mounting. The universals on the outer ends of the driveshafts are ingeniously worked out to give constant angular velocity in all positions

turning circle diameter. The maximum angular deflection of the joints is given as 41½ deg., which gives a turning circle diameter of only 42 ft. Thus two disadvantages commonly attributed to front-drive cars have been eliminated by this design.

As will be noted from the illustration of the front drive mechanism, the outer universals are located practically above the center of tire contact with the road, so that the maximum deflection inherently available in the universals can be used for steering. Naturally this design made necessary the provision of special wheels with deeply recessed hubs. This had the additional advantage that centerpoint steering could be provided, thus reducing largely the effort required for steering, especially in rounding curves, while a reduction in wheel fight is apparent.



The instrument panel of the Cord is in attractive crackle finish, with instruments and controls in two panels each. The gear shift rod ball is shown at the lower center

The steering action in actual performance is quite remarkable. The writer drove a car, with one tire practically flat, with the hands removed from the wheel and without any indication of shimmy up to 60 miles per hour. The gear itself is a Gemmer, with the long steering column almost horizontal and provided with an adjustable bracket on the dash. Although a 20-to-1 ratio is used in the gear, this is reduced by the steering arm linkage to less than 18 to 1 (the same as is used in the Auburn 120), but the car handles with perfect ease under all conditions.

An interesting brake hook-up has also been worked out. Four-wheel braking is obtained by means of hydraulic wheel brakes at the rear and hydraulic brakes between the differential and the two driveshafts at the front. The front brake drums are carried on the grooved drums enclosing the inner universal joints, while the brake operating mechanism is bolted to the side faces of different housing. The entire brake assembly is enclosed in cast aluminum covers which hide it from view but permit access to the adjusting nuts between the covers and the differential housing.

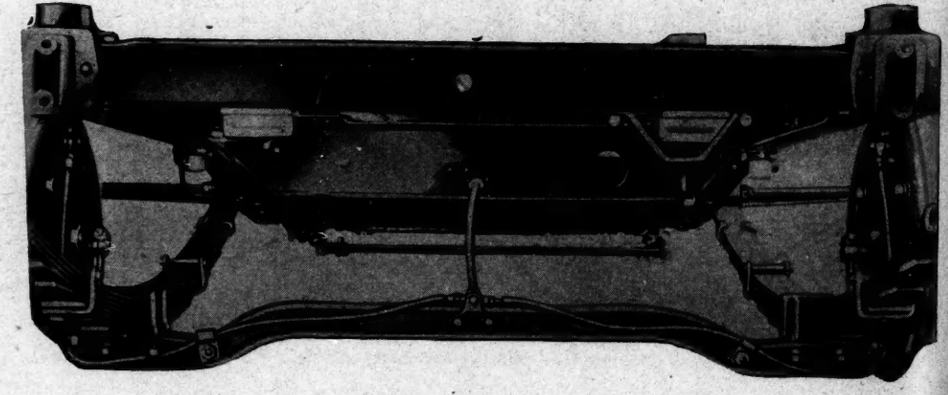
Braking effort has been worked out on a 60 per cent front, 40 per cent rear basis, with the clutch disengaged, by using larger brake drums in front. The proportion of the front wheel braking effect is still further increased when the clutch is engaged. This is a desirable feature, considering the larger proportion of weight on these wheels as compared with the conventional rear-wheel drive, and that during deceleration a percentage of the car weight is transferred from the rear to the front wheels.

An emergency brake, hand-operated, is provided, which actuates the rear wheel brakes mechanically through a rear cross shaft mounted on three bearings, the inner of which is of the "steady-rest" type.

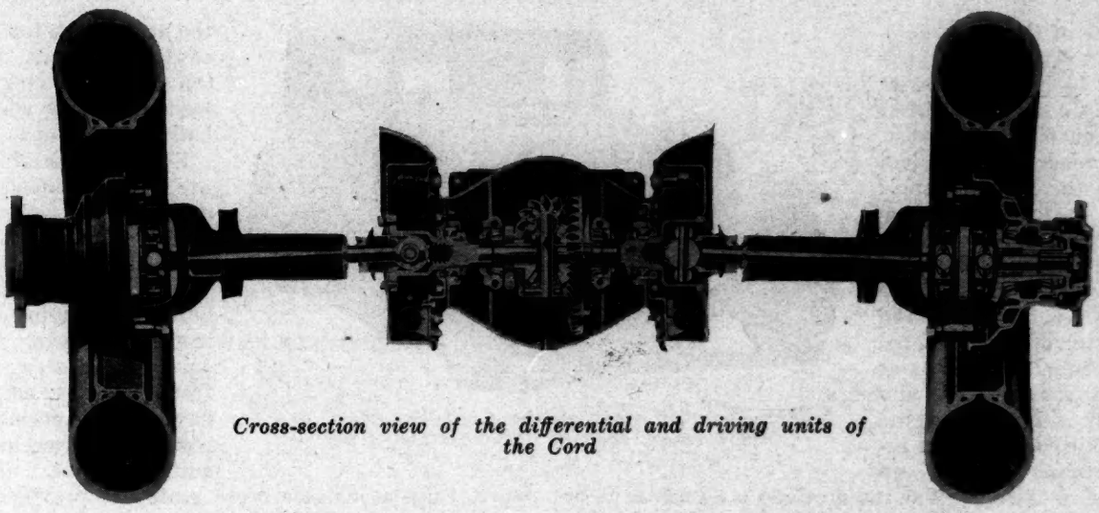
On the Cord the usual gearshift lever is replaced by a turn and pull type horizontal rod extending through the dash centrally below the instrument board. This rod is carried forward across the top of the engine, at the front of which it is supported in a bracket from the cylinder head, equipped with rubber-centered rollers, the rubber being intended to prevent binding.

At the forward end of the rod, a ball joint connects it to a vertical lever which operates in a manner similar to that of the usual gearshift lever. From the driver's position, however, the gearshift positions are reversed. Thus turning the lever to the left and pushing it in gives low speed, to the right and in is high, to the right and back is second, and to the left and back is reverse.

As to the engine accessories, the usual oil filter and air cleaner are provided. The battery is mounted in front of the engine over the transmission case, back of the fan. The latter unit is driven by a Vee belt from an extension of the generator driveshaft carried over the transmission case. This shaft is chain-driven from the crankshaft and also drives the water pump ahead of the generator.



Rear of the Cord chassis, showing the rear axle. This is of the I-beam type and unusually light. Note that the rear springs are of the semi-elliptic design, shackled at the rear and overslung on the axle



Cross-section view of the differential and driving units of the Cord

Inlet manifolding is fairly conventional, with a by-pass hot-spotting arrangement, while the exhaust manifold is carried down at the front, with the muffler located under the hood and a long exhaust pipe terminating in a wide flat tail pipe, following the lower contour of the gas tank at the rear of the chassis. The fuel is fed to the Schebler carburetor by means of an AC fuel pump driven off the rear of the camshaft. Thermostatically operated radiator shutters furnish water temperature control. They also form the Vee shaped false radiator front. Bijur chassis lubrication is standard equipment, with the outer front universals lubricated from a reservoir enclosed in the central ring, and with the inner universals packed in grease with a double oil seal. It is stated that the universals require lubrication only about every 10,000 miles.

The frame, naturally, is entirely unlike that used on rear drive cars. The elimination of the rear driving axle has made a kickup unnecessary. Thus from the small kickup at the extreme front of the side rails, provided in order to enable the mounting of springs both above and below the channel, the side rails are perfectly flat at the top to the extreme rear.

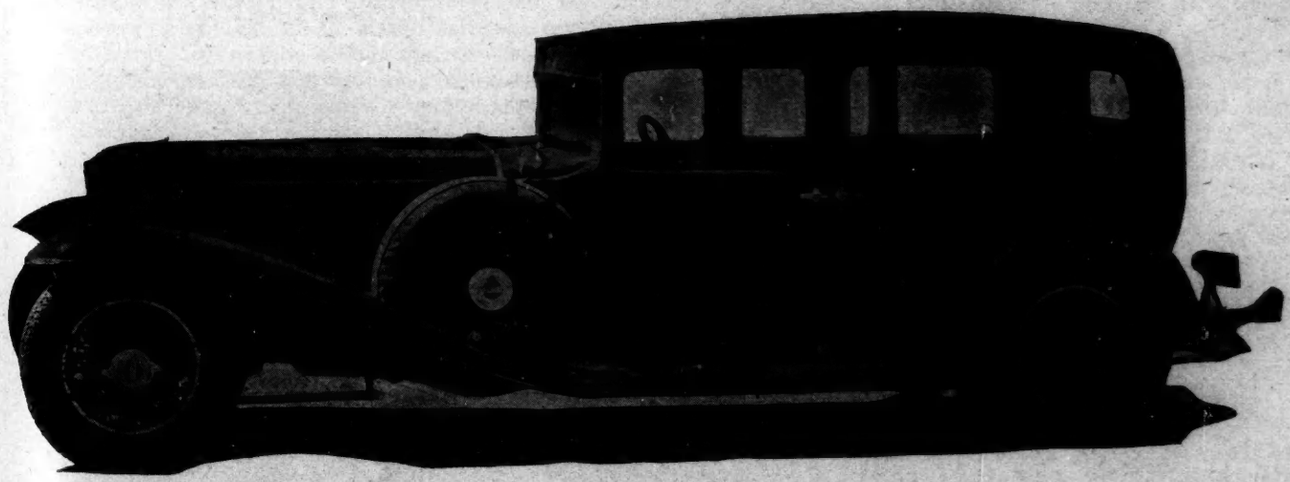
Only five actual cross-members are provided. All of them are located back of the engine. The front of the frame is well braced, however, by means of the four-point rigid engine suspension and the transmission housing, which is also bolted to the side rails. The channel at that point is converted into a box shape by the riveting in of a reversed short reinforcing channel, the outer web being cut away for access to the transmission case and spring mounting bolts.

The cross-members at the rear are all of the channel type, with the two front members X shaped, gussetted at the center and extending the full depth of the frame side rail. The tail end of the frame channel is decreased in depth for lightness and also to provide for a larger maximum vertical rear axle travel. At this point a reinforcing channel is riveted into the side member. Rear springs are of normal semi-elliptic design, shackled at the rear and overslung on the I beam rear axle.

The front springs are attached to the tubular front dead axle at the top and bottom through rubber shock insulators. These springs are not parallel to the frame but point outward from the side channels, in order to be more nearly perpendicular to the dead axle at the point of attachment, for better absorption of road shocks and transmission of driving pull to the car.

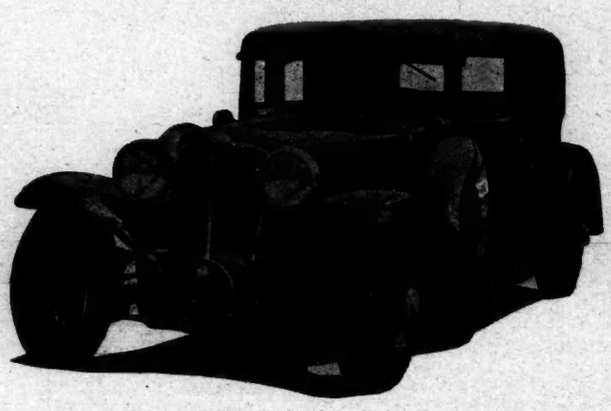
With the straight frame, body mounting is naturally simplified, the sills being straight and the rear seats at the same height as the front. Rubber pads are used between the body sills and the frame for noise insulation. The body itself is wide enough to extend out to the running board splash guard, leaving practically no hood sill and giving the car a cleaner appearance.

The running boards are all-metal, with rubber strips running longitudinally. Headlamps are mounted on brackets on the fenders, with a tie rod extending through



This view of the Cord sedan shows the neat body design made possible with the front-drive mechanism. The abrupt effect of the sun visor, the false radiator front and long lines of the hood are examples of the new treatment

and back of the false radiator front. A sheet metal pan colored to harmonize with the body covers the differential housing at the front. Front fenders are bolted both to the frame channel and to the cast aluminum brake cowling for rigidity. Fender wells for the carrying of spare wheels dress up the sides. Tail lights and traffic signals are mounted on individual stanchions at the rear frame corners, and the body is faired into the gas tank cover pan in a reverse curve, cleaning up this part of the car. The radiator cap is so flat as to be almost invisible.



Three-quarter view of the Cord brougham or sport sedan, showing false radiator front

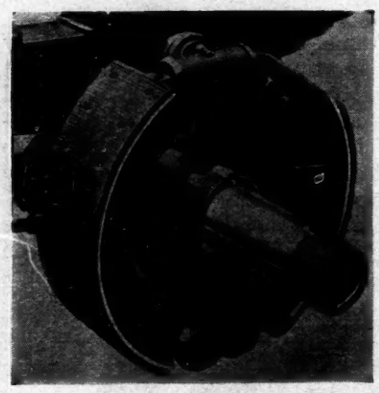
The sun visor, as will be noted from the illustrations, is very abrupt, giving an unusual line. In effect, this visor serves as a false front also to the top windshield cross bar, which is quite deep, as the windshield is of the crank-operated lifting type. Ventilation is provided by the use of both top and side cowl ventilators, the two top ventilators opening forward and the side units backwards.

Since all driving units are located ahead of the dash, and the latter is well insulated, noise has been reduced. The insulation also serves to confine engine heat to the engine compartment. Leg room for both driver and passenger in the front seat is ample, the dash pocket enclosing the rear of the engine being quite narrow. Furthermore, fully adjustable cross seats are provided in the sedan.

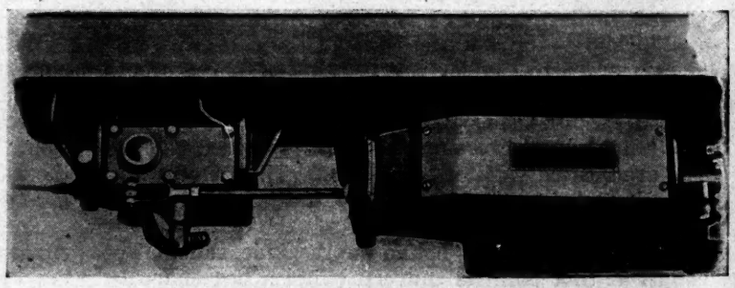
Standard equipment includes Houdaille shock absorbers all around, two windshield wipers, dash gasoline gage, oil level gage, engine thermometer, cowl lights, rear traffic signal, courtesy lights on the running boards, two synchronous horns and automatic radiator shutters.

Vacuum-Operated Hydraulic Brakes on New Federal Trucks

THE new 4-C6 truck of the Federal Truck Motor Company, to which reference was made in a recent issue of *Automotive Industries*, is equipped with Lockheed two-shoe, internal hydraulic brakes on all four wheels. The drums of the rear wheels are nearly 18 in. in diameter and have a width of 5 in. The brakes are enclosed by backing plates in the usual manner. Operation of the brakes is effected by a vacuum cylinder which is said to add at least 50 per cent to the operating effort exerted by the driver. In addition to the four-wheel hydraulic brakes the truck is provided with an emergency brake which acts on the worm shaft of the Tinken worm-driven rear axle. This latter brake is also of the internal type. Details of the brakes and features of their assembly are shown herewith.

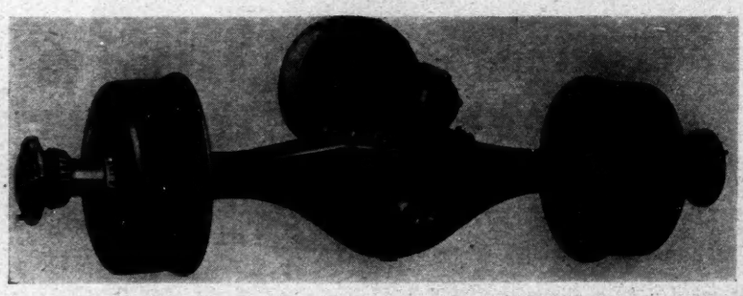


View of shoes of Lockheed internal rear-wheel brakes



Vacuum cylinder used with four-wheel hydraulic brakes on the 4C6 Federal truck

To the right is a view of front axle end and wheel with internal brake



Worm-driven axle with wheel brakes and wormshaft emergency brake on new Federal trucks

Aviation Engine With Duplex Parts Designed by *Arthur Chevrolet*

Duplicate carburetion, oil feed control, camshafts and valves are built into powerplant to increase safety factors in commercial aircraft flight.

By ARTHUR C. BUCK

A NEW four-cylinder air-cooled inverted aviation engine of light weight and with duplicate working parts is being developed by Arthur Chevrolet, widely known builder of race cars and automobile engines and president of the Arthur Chevrolet Aviation Motors Corporation.

Then engine, according to its inventor, weighs only 325 pounds and is capable of developing 150 hp. at 2700 r.p.m. It is designed to fill the need in the aircraft industry for a lighter weight, higher efficiency power unit in the moderate priced commercial type airplane.

The four-in-line construction of the new Chevrolet engine makes for smaller resistance area at the head of the plane, the engineer explained, and, with the engine inverted, its width of less than twelve inches eliminates the "blind spot" which engines of 40 in. width, in common use, cause for the flier.

A six-in-line and a twelve-cylinder engine are also in the process of development in the Chevrolet shops. Patents cover twenty-three features of the new powerplants.

Known as "Chevolair"

The four-in-line unit, known as the "Chevolair," was placed on the testing block late in May and has passed through long periods of continuous operation without faltering, being stopped only to make changes in types of carburetion, according to Mr. Chevrolet.

The designer asserts that besides developing greater horsepower to the cu. in. of piston displacement than any other aviation engine now in use, the four-cylinder job, by accurate check, is running cooler than any other air-cooled aircraft or automobile engine now in use. Temperatures of oil are maintained at approximately 122 deg. Fahr., whereas in other air-cooled aviation plants it stands at about 160 deg. through steady operation.

Mr. Chevrolet, in telling the history of his achievement, declares he has been at work for three years on this task, always keeping the industry's demand for safety uppermost in his mind.

"The main object," he said, "was to remove the fear of breaks and stops in the powerplant while in flight; to make the factor of safety as great as possible. With that idea in view I designed an engine in which practically all working parts are duplicated. Government regulations require duplicate magnetos. I went a step further and built a powerplant also having duplicate carburetion, duplicate oil feed control and camshafts in duplicate, with duplicate valves—all built into the engine. It might possibly be called an uno-lateral engine.

"As a parallel, it could be said that the laws of nature which gave all animals duplicate members of the body were followed in designing this engine. A man has two eyes, two arms, two legs, two ears, and so on, with the result that if one member is lost the other can take its place. So it is with this engine. Failure of one oil feed control, one carburetor, one camshaft, and so on, will not reduce the dependability or efficiency of the engine, and, above all, will not occasion stops that many times have proved fatal to fliers.

Designed for Long Life

"The engine also is built so as to remove all possible chance of adjustments coming loose. It is so constructed that after it has been assembled no adjustments are required. Added to these factors are others so designed that it will have five times the life of other airplane engines.

"The power output in the first two weeks the engine was on the testing block is far beyond my expectations and even beyond anything anyone before this time had thought possible. The power curve ranges from 85 hp. at 1500 r.p.m. to 150 hp. at 2700 r.p.m. And the maximum has not yet been attained. Through the period of testing we have not had any failures in parts or operation, and no 'bugs' in engineering have been uncovered, as usually is the case in design of new engines. It has been run every day and does everything asked of it and is as sound as when it was put together, which bears out the theories of design.

"It is our firm opinion that it will create a sensation when it is released in aviation circles. We more firmly believe it represents a powerplant development that every airplane designer has been looking for. Our tests have produced concrete evidence of these facts."

Mr. Chevrolet expressed the belief that the engine could be manufactured on a production basis comparable with the production of automobiles and as efficiently and economically.

The designer has been building gasoline engines for thirty years and was one of the pioneers in engineering the high efficiency racing engines of the present day.

In the early days he was a member of the famous Chevrolet brothers racing team.

Announcements of production plans of the Chevrolet aviation plant will not be made for several months, the engineer said, until tests have thoroughly proved this engine and perhaps other larger engine developments the firm may undertake. B. P. Prunk is vice-president of the company, and G. S. Griffin secretary-treasurer.

Four-Wheel Power Brake System Introduced By *Stewart-Warner*

The assembly includes suitable linkage operated by an amplifier mounted on the rear of the transmission. It is equally effective for forward and reverse motion.

By P. M. HELDT

A NEW four-wheel braking system with servo action derived from the propeller shaft is being offered the industry, for use on large-scale-production cars, by the Stewart-Warner Speedometer Corp., Chicago. The system comprises a power unit or amplifying mechanism on the propeller shaft, four two-shoe, nonwrapping internal brakes, and suitable linkage.

As illustrated in Fig. 1, the power unit is mounted on the rear of the transmission and is adapted to apply the four-wheel brakes through a yoke shaft that extends into the housing of the unit. Outside the housing, the yoke shaft has a double-armed lever keyed to it, which connects by pull rods to camshafts extending parallel with the front and rear axles.

By referring to the cross-section of the power unit, it will be seen that a hub *B* with a coarse thread (or helical spline) is secured to the drum. The hub and the drum are free to revolve on the transmission driveshaft *C*, and the gripping effect of the power unit shoes when these are applied to the drum, will retard the drum relative to the driveshaft. When the car is moving forward, this action will screw out the intermediary actuating member *D* (moving it to the left in the illustration). The yoke shaft *E* (Figs. 3 and 4), pressing against the yoke thrust bearing *F*, will then be moved angularly around its axis, with the result that lever *A*, which is secured to it, will apply the wheel brakes.

When the driver presses on the brake pedal while the car is running backward, the intermediary actuating member *D* will be moved by the screw or helix cut on the power unit drum hub in the reverse direction, that is, toward the right in the drawing, and it will immediately end up against a shoulder on the drum hub. This same part *D* is cut with a reverse thread or helix on its outside, with which it engages the threaded sleeve carrying the thrust bearing collar *F*. Since the rotation is now in the reverse direction, and the thread also is reversed, the sleeve carrying the thrust bearing will be moved in the same direction as in the previous case (forward motion), that is, toward the left in the illustration.

From this, it is evident that the brake-applying lever functions in the same way whether the car is moving forward or backward. The pitch of the threads is such that the mechanism is completely reversible, so that when the pressure on the power-unit shoes is released, the retracting springs will immediately release the brakes. To increase the degree of reversibility of the screw and nut mechanism, a ball thrust bearing *G* is inserted between the drum hub *H* and the universal joint flange hub *I*.

Since the brake-applying linkage is operated from a power unit turning at varying speeds, rather than directly from the brake pedal, special provisions are made to insure smooth application of the brakes regardless of the speed of the propeller shaft, and regardless of inertia effects of the revolving parts of the power unit. These provisions take the form of a stabilizer, which is intended to prevent both too rapid application and "over-application" of the brakes, by which latter term is meant, evidently, more powerful application than intended by the operator.

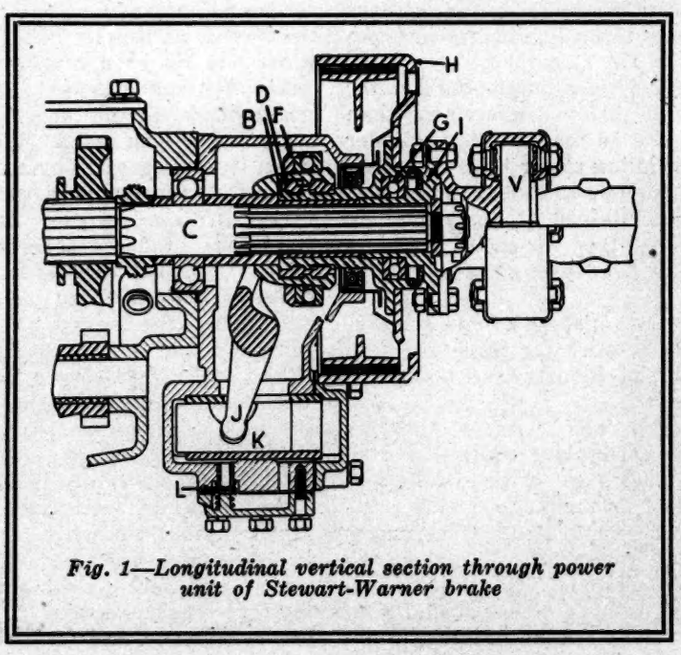


Fig. 1—Longitudinal vertical section through power unit of Stewart-Warner brake

The yoke shaft *E* is provided with an arm *J*, which extends into a recess in a plunger *K*, this latter being located in a dashpot submerged in the lubricating oil in the housing. On operation of the yoke shaft, by-pass valves allow the oil to flow from one end of the dashpot to the other. Valve *L* (Fig. 1) opens when the

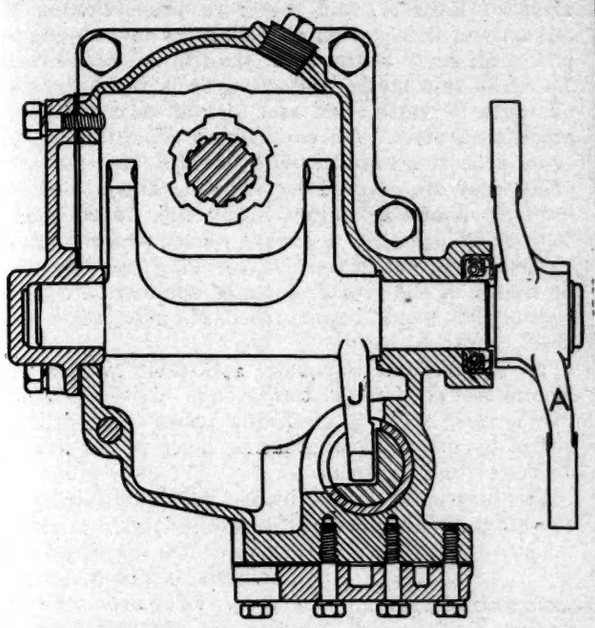


Fig. 2—Vertical cross-section of power unit through axis of yoke shaft

brakes are released, and the plunger *K*, therefore, moves from right to left, and there is a similar valve in another passage between the two ends of the dashpot, which opens when the brakes are being applied. This latter valve offers a certain resistance to the motion of application. These valves are controlled by springs, whose pressure is so proportioned that the required dashpot effect for smooth action of the brakes will be obtained regardless of inertia effects and the speed of the power unit drum.

If desired, a pedal modulator linkage can be provided between the pedal applying lever *M* and the power-unit cam lever *N*. The object of this linkage is to permit a more gradual increase in the pressure applied to the power unit, with pedal travel. When the pedal is first depressed, the shoes are brought into contact with the power drum and the brakes are applied. Continued movement of the pedal compresses the spring and increases the pressure on the power unit shoes at a rate depending on the characteristics of the spring.

Referring to Fig. 5, pedal link *O* is connected to a primary lever *P*, which is held in a fixed position by a stop *Q*, owing to the resistance of the modulating spring *R*. When the pedal is depressed, the effect is that of a simple lever acting around fulcrum *S*, and the clearance between the shoes and the drum of the power unit is quickly taken up. Thus the brakes are applied almost instantly. Upon farther pedal motion, the spring *R* will be compressed and intermediate lever *T* will swing around fulcrum *S*, with the result that the contacting face *U* of the primary lever will slide along the end of cam-operating lever *N*. The contact surface is at such an angle that it will stabilize the sliding effect and cause the proper release as the pedal is returned. When the modulating spring is fully compressed, the effect is again that of a simple lever and the location of the clevis pin relative to the fulcrum is such as to give the desired pedal pressure for "fulcrum braking."

There are thus two ranges through which the brake can be applied, a driving range and an emergency range. In the driving range, the transmission of pressure from the pedal to the power unit is modulated by the spring, while in the emergency range the pressure is transmitted directly and positively.

The power unit drum is mounted directly on the propeller shaft, and when the shoes are applied to it by depression of the brake pedal, it acts as a transmission brake, adding its braking effect to that of the rear wheel brakes. This is one of the reasons why more of the brake-applying force derived from the power unit is apportioned to the front than to the rear brakes, as explained further on.

The cams *V* in the rear brakes, which are comparatively large, are self-aligning, because the camshafts are supported on the axle only at one point and that near the center housing. The front camshafts are mounted in a similar way, and

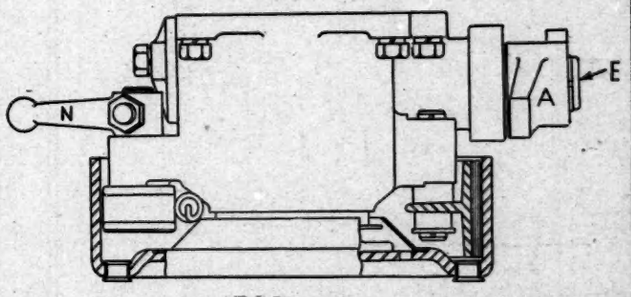


Fig. 3—Plan view of power unit, sectioned

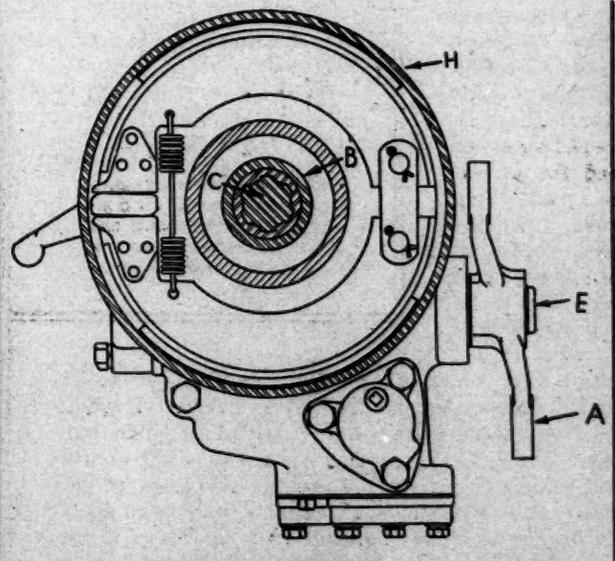


Fig. 4—Vertical section through power unit, showing drum, shoes, expanding cams, yoke shaft and brake lever

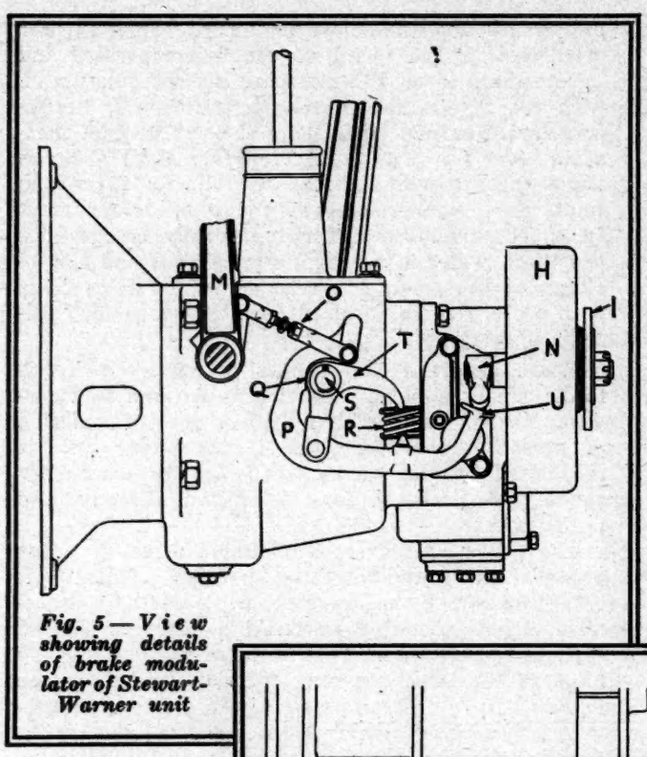


Fig. 5—View showing details of brake modulator of Stewart-Warner unit

the cams are supported on them in such a manner that when the wheels are deflected in steering, the brakes are released.

The brake lever (emergency brake) is designed to apply the rear brakes directly, and it also exerts a pull on the front brakes through the brake-applying yoke shaft lever. There is, therefore, no need for an extra parking brake. On the yoke shaft of the power unit there are a set of buttress keys *W*, with a lost motion slot which allows the hand brakes to be applied independent of the power device. Even if the front-brake lining were completely worn out, there would always be braking surface left on the rear brakes in an emergency. If any part of the system should fail, it would still be possible to apply two brakes by either hand or foot, and even if the yoke shaft fulcrum should fail, the rear brakes could be pulled on directly.

The force of application derived from the power unit is apportioned between the front and rear brakes by suitably proportioning the lengths of the arms of lever *A*, and therefore proportioning the amounts of link motion as well, more force being applied ordinarily to the front than to the rear brakes. To make this method effective, it is necessary that all parts be quite rigid and that all adjustments be made accurately. On cars where conditions of unequal deflection have to be coped with, the equalizing effect may be secured by allowing the yoke shaft lever to float. Distribution by link travel rather than by an equalizer is always recommended, because if the front brakes wore faster than the rear ones, by reason of the greater force of application the proportionality would be disturbed, if an equalizer were used.

The power unit is equally applicable to cars with Hotchkiss and with torque-tube drives. Where torque-tube drive is used, the power unit drum is cooled by providing ventilating holes in the housing surrounding the drum.

The only points in the brakes requiring lubrication are eight line-contact, self-aligning highly hardened fulora, which are enclosed in a housing packed with heavy grease. They are said to require no further attention as regards lubrication during the life of the car. The brake shoes are fully protected by the drums, and the openings through which the camshafts pass are closed by leather boots. The camshafts float around their anchor and rod-connecting points, so that no bearings are required other than the surfaces which keep the cams in their correct position with respect to the shoes. All parts of the four brakes on one car are interchangeable.

There are no castings in the brake. The front cam-

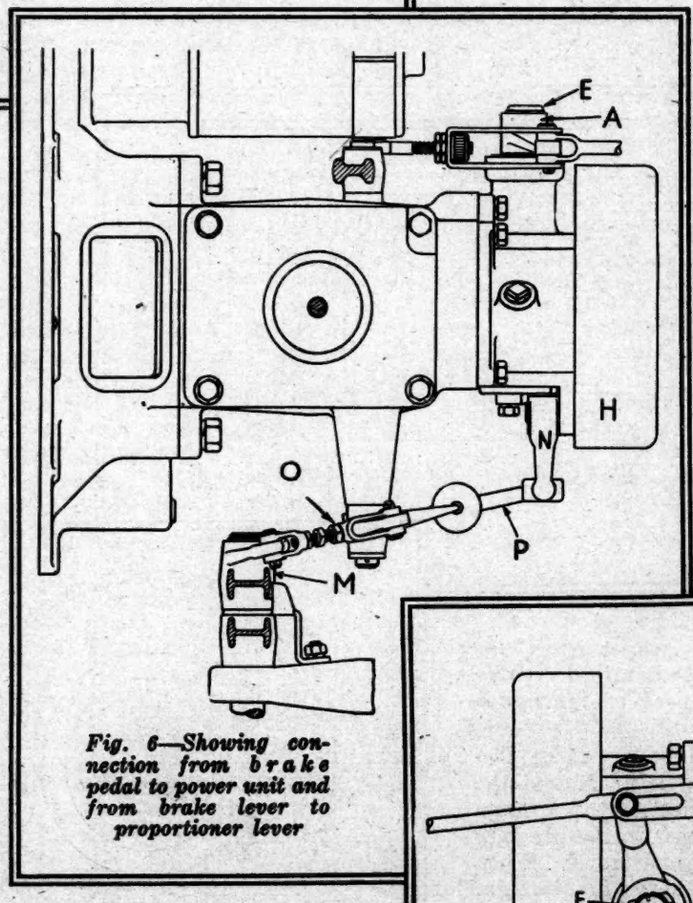


Fig. 6—Showing connection from brake pedal to power unit and from brake lever to proportioner lever

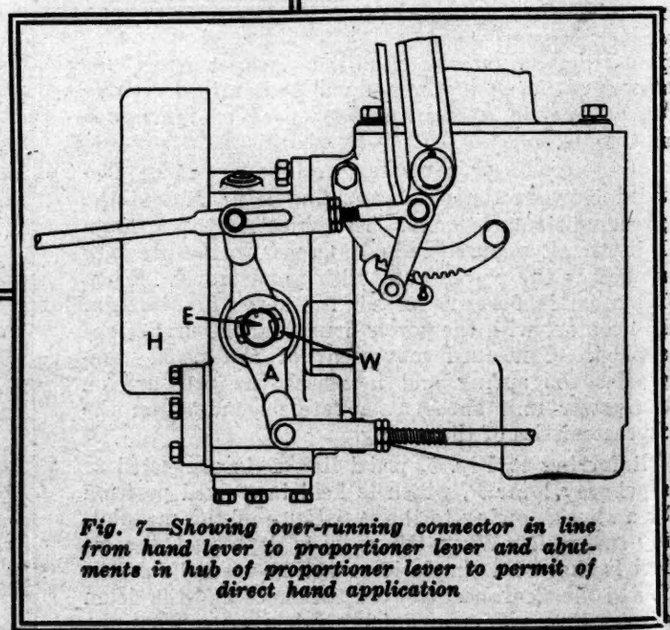


Fig. 7—Showing over-running connector in line from hand lever to proportioner lever and abutments in hub of proportioner lever to permit of direct hand application

shafts and the camshaft levers are bent in the press, and the cam ends are simple forgings which are welded to the ends of the camshafts. These cam ends constitute the only forgings in the equipment. The wear plates, adjusting wedge, anchor bracket and brake shoes are made from rolled bar sections. The rod ends are standard parts and in some instances are stampings.

In order that the brakes may give satisfactory service with the amplifying mechanism, all parts are designed for great rigidity and wear resistance. With the exception of the camshafts, all parts are interchangeable between front and rear.

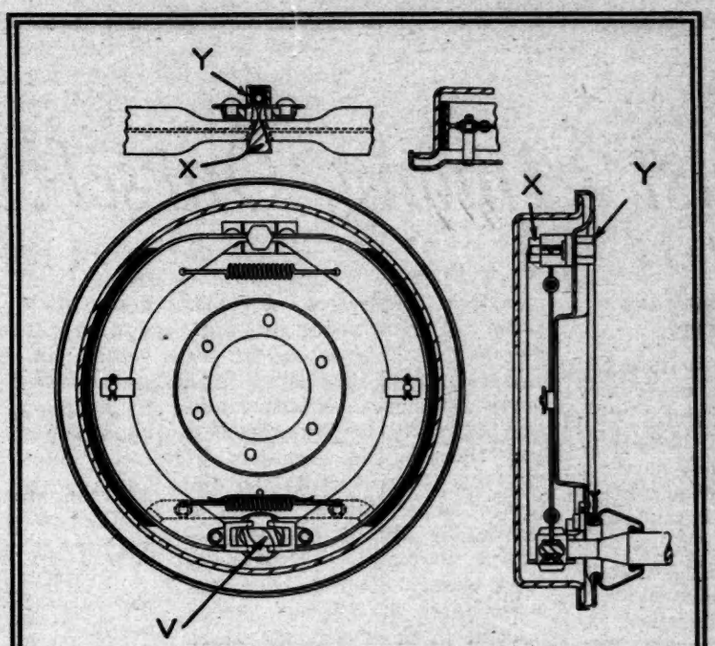


Fig. 8 — The Stewart-Warner power brakes proper, with details

A separate adjustment is provided for each of the four brakes, the adjusting means consisting of the wedge *X* and nut *Y*, by which the anchored ends of the shoes can be moved farther apart as the lining wears. The range of adjustment is sufficient to take care of the maximum wear on ¼ in. brake lining. By providing this comparatively large range of adjustment, frequent relining is rendered unnecessary, although adequate provision is made for adjustments.

The adjusting means are shown in the detail view accompanying the illustration of the brake proper (Fig. 8). Two channel slots are cut in a hexagon stud which is moved longitudinally by means of a broached nut. The broached grooves create an audible click when passing over a ball forced into them by a spring, which makes possible an accurate predetermined withdrawal of the brake shoes from the drum by merely tightening up this nut and backing off a predetermined number of "clicks." Each "click" corresponds to approximately a 0.004 in. movement of the shoe anchor end, which causes a withdrawal of approximately 0.002 in. at the point of contact of the shoe with the drum midway between the anchor and the cam.

At the other end of the shoe, there are wear plates which are machined from rough bar stock, and are so designed that they accurately position the camshaft in the drum endwise, while at the same time retaining it centrally between them when the shoes are expanded. When the spring retracts the shoes, the faces provided on the barrel cam end positively position them.

Cukor Develops Front-Drive Chassis

A FRONT-DRIVEN chassis developed by Cukor Kalman, of Budapest, Hungary. Mr. Cukor has been a champion of the front drive for many years and claims to have designed a front drive many years before the Alvis, Bussien (Voran), and Tracta cars with front drive appeared on the market. In addition to front wheel drive the car shown has two other unconventional features. The front wheels are independently sprung and the chassis and body frame are in one, which makes for great rigidity. Sliding doors are employed and the rear part of the body superstructure is of light construction. The chassis illustrated is of a light car and is powered by a Jap air-cooled motorcycle engine of British manufacture. The front part of chassis can be detached by loosening eight bolts at the dash.

Side and front view of Cukor light car chassis with front drive

Just Among Ourselves

Is Management's Chief Job the Selection of Talent?

"THERE is no substitute for talent," says Aldous Huxley in "Point Counter Point." "Industry and all the virtues are of no avail," he continues, speaking of high quality achievement in art. Management, it often seems to us, may waste a deal of precious time by refusing to accept as true this particular doctrine in relation to men on whom executive responsibilities rest. Perhaps there is a subconscious feeling that such a doctrine is just a bit undemocratic; out of tune with our automotive industrial ideals.

Wonder if there is any need for such feeling, however. Only one job in modern industry out of 10 requires high talent for successful execution. Industry and all the virtues will suffice for the other nine. As a matter of fact, may not management's chief job be making sure that those positions, which require talent as an integral part of their successful accomplishment, are always in the hands of talented men? Isn't it true that only thus can the majority of untalented benefit the most?

We would almost be willing to guarantee, incidentally, that if you read "Point Counter Point" you will find in it a detailed psychological study of at least one person whom you know. The book is one of the fine things of modern literature.

* * *

Is Achievement Enough; or Must It Be Done Our Way?

TALENT, of course, is of many varieties. The need of the executive, naturally, is high talent for the particular requirements of his specific job. Talent, whether in the arts or in business, it seems to us, involves among other things the creation of something from the contemplation of which other men gain inspiration: not that talent can be defined in this way; merely that this is one of the essential parts of talent. And many automotive executive jobs can be handled with top success only through the possession of this particular quality on the part of the executive. Plenty of thoroughly efficient men are unwilling to put into their daily work enough of their emotional selves to do the job as it should be done in those elements which require contact with others.

Most of us like to believe that men are led to business achievement only through purely logical processes. Yet few of us in our hearts actually do believe that to be the case. We have seen men, potentially executives of the most successful type, fail of maximum achievement because they insisted, not merely on getting certain subordinates, superiors, or coworkers to do certain things, but also on getting them to do the things solely for the reasons that the executive himself believes they should be done.

It is the old argument about whether the means or only the ends should be insisted upon by one seeking accomplishment through the inspiring of others. We'd be delighted to get any of your thoughts on this somewhat abstract—though practically important—question.

* * *

English Motorist Is Taxed 66% More Than American

"IN the last year," says a recent newspaper item, "the English motorists were taxed more than $127,605,000 for the operation of 1,758,000 vehicles." . . . . . Last year motorists in the United States were taxed in license fees and gasoline taxes about $610,811,000 for the operation of about 24,500,000 vehicles.

Getting out our pencil and doing little long division we find that the average tax per vehicle in England last year was something like $72 per vehicle and in the United States about $25 per vehicle.

* * *

All Sympathetic Inquiries Replied to—Efficiently

WHILE out in Detroit last week, a friend of ours dropped in at the Chrysler office to see B. E. Hutchinson, vice-president in charge of finance. Hutchinson is using a pair of crutches due to a broken toe from which he has been suffering for several weeks.

Our friend made the usual inquiry as to how the foot was getting along. Without answering, Hutchinson turned to his desk, picked up a carbon copy of a typewritten note from the top of the pile and handed it to our friend. Here is what the note said:

Q. What is the matter with you?
A. I have broken my toe.
Q. How did you do that?
A. I kicked it against the door jamb when I got up in the morning a couple of days ago.
Q. How long will it take to get well?
A. The doctor tells me it will probably have to be in splints about two weeks during which time I will have to walk on crutches.

General Comments: Your sympathy, if you have any, is very much appreciated. It is excusable if you smile a little bit, but raucous laughter is apt to hurt my feelings.

To the suspiciously minded I again repeat that the foregoing is my story and I stick to it. The accident happened in the *MORNING* after a good night's rest.

Note: Those interested in obtaining further clinical details regarding this accident are invited to communicate with my physician, Dr. Robert W. Parr, General Motors Building.

Swell idea, we calls it.—N.G.S.

Ten Reports of Standards Committee Approved at S. A. E. Meeting

All division recommendations, excepting revision of balloon tire and rim sizes, adopted at first session of summer gathering at Saranac Inn

At the meeting of the Standards Committee of S.A.E., held on last Tuesday morning at the Summer Meeting, Saranac Inn, Upper Saranac Lake, N. Y., all recommendations of the 10 divisions of the committee were adopted, with the exception of the proposed revision of the standard for balloon tires and rims for passenger cars, submitted by the Tire and Rim Division.

The Aircraft Division recommended for approval as an S.A.E. Recommended Practice specifications of airplane tires, wheels, rims and axle ends. A table of tire dimensions given contains wheel sizes from 10 by 3 to 54 by 12 in., including 18 different tire sizes fitting 10 different wheel sizes. Another table gives the carrying capacities of the different tire sizes under different inflation pressures, these extending from 195 lb. for the 10 by 3 tire with an inflation pressure of 30 lb. p. sq. in., to 15,000 lb. for the 58 by 14 in. tire with an inflation pressure of 70 lb. p. sq. in. Of the 18 tire sizes specified, 10 are regular sizes and eight over-sizes, and a third table gives the recommended maximum static load for each tire and the corresponding inflation pressure; the maximum tire deflection under this load in per cent, the static load required to completely collapse the tire under the recommended inflation pressure, and the minimum wheel strengths in lb. with respect to both radial and lateral loads.

Specify Airplane Wheel Rims

The airplane wheel rims specified are of the straight-side, drop-center type. The list includes only seven sections, varying from 2⅛ to 7 in. width between flanges. Another table gives dimensions for six different sizes of airplane tire valves of the angular type, two of the valves being right-angled, while the other three include angles of 110 and 120 deg. between their two ends.

Two types of landing wheel hubs and axle ends are specified, with plain and anti-friction bearings respectively. There are 10 sizes, corresponding to the 10 sizes of wheel. In connection with the dimensions for hubs for anti-friction bearings, the Airplane Division had requested a review by the Ball and Roller Bearing Division, and the latter recommended enlargements of the wheel bores for the bearings in several instances, so as to permit of both ball bearing lay-outs and roller bearing lay-outs for bearings having even fractional dimensions.

The S.A.E. has had a standard rating for aircraft storage batteries on a 20-minute discharge basis, but it was found that the capacities actually obtained differed considerably from those ratings, hence the rating was changed from 50 to 44 amperes in the case of No. 32 battery; from 75 to 66 in the case of No. 34 battery, and from 113 to 99 in the case of No. 36 battery.

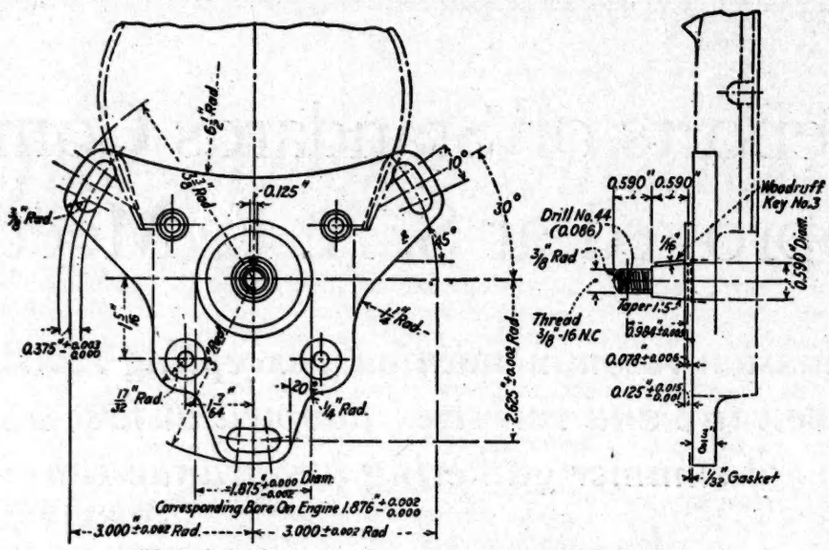
The adoption as an S.A.E. Recommended Practice of instrument mountings which have been adopted as Army-Navy standards was recommended.

Aircraft Engine Spark Plugs

The Aircraft Engine Division recommended for adoption as an S.A.E. standard an aeronautic spark plug quite similar to the present metric standard spark plug, the chief difference being that the lengths are held smaller. The total height above the seat must not exceed 2⅝ in. and the length below the seat is made ½ in., with 3/32 in. nominal allowance for the throat directly below the seat. The present metric standard spark plug has a maximum reach of ⅝ in. below the seat, and in order to insure conformity in essential details between the new aeronautic plug and the metric-type automotive plug as used with motorcycle and automobile engines, it was proposed to change the maximum reach below the seat of the metric plug to ½ in. Specifications for an aeronautic spark plug ball terminal also were recommended.

The Committee was asked to give its approval to adoption as an S.A.E. recommended practice of specifications for propeller-blade clamp rings, bolts and nuts, and for propeller-blade ends for demountable propellers, which had been approved already by the Army-Navy Standards Conference. It was also recommended to put back in the drawing for splined shaft ends for propeller hubs, two dimensions locating the rear cone, which had been omitted as unnecessary when this standard was adopted, but the replacement of which had been asked for by engine manufacturers. Other proposals made by this division included the adoption of thermometer bulb specifications as an S.A.E. standard, a revision in the tachometer drive recommended practice, and the adoption of standard flanged mountings for magnetos. Two such mountings are proposed, a two-bolt mounting for the smaller, and a three-bolt mounting for the larger sizes.

The Ball and Roller Bearing Division, on the request of the Electrical Manufacturers Association, had tabulated an extra-wide series of bearings for use in electric motors. The series partly overlaps the S.A.E. series of wide bearings and includes also a considerable number of sizes above those ordinarily used in automotive practice, which are grouped in a separate table and recommended for adoption as an American Recommended Practice.



Three-bolt flanged magneto mounting and connection

It is proposed to include in the S.A.E. standard for roller bearing sizes about 75 additional sizes which the Timken Roller Bearing Co. has in production and which include sizes that are actually being used by automobile, truck and axle manufacturers.

The Electrical Equipment Division has revised completely its specifications for non-metallic flexible conduit. The new specifications are as follows:

Non-Metallic Flexible Conduit: General Information—Non-metallic flexible conduit is recommended for use as insulated covering over insulated cables as additional mechanical protection; also as protection to the cable from water, oil and grease. This non-metallic conduit is also recommended for use as a covering for copper or other metal tubing to prevent crystallization and to eliminate unnecessary rattles.

Conduit Construction

Construction.—This conduit shall be of single-wall construction of closely woven cotton-warp strands interlocking around twisted Kraft-paper fillers that will not unravel and must have sufficient mechanical strength before impregnation. The finished conduit of the size specified shall slip freely over a 12-in. long polished mandrel of the dimensions given as the minimum inside diameter. This dimension is the size under which the conduit will be referred to and shall not vary from the size given more than minus 0.000 to plus 0.020 in. Standard sizes are listed in the following table, with respective paper and cotton requirements. Values given in the table are minimum figures unless otherwise designated.

Saturation.—The conduit must be thoroughly impregnated inside and out with water, oil and acid-resisting compound and must be free from heavy or gummy deposits of the impregnating compound. This impregnation is introduced to prevent moisture absorption, to bind the weave to the required wall strength and to prevent fraying of the cotton ends. The polished mandrels used for checking the inside diameters shall show no sticking or discoloration at any temperature up to 150 deg. Fahr. The compound must not drip from the conduit when submitted to a temperature of 220 deg. Fahr. for 15 min. The ends of the conduit must not fray or the weave separate readily when the end is cut at a 90-deg. angle.

Finish.—The conduit must be finished with at least two coats of black pyroxylin lacquer producing a good luster and a good bond to the fabric. The lacquer must be thoroughly dried before wrapping or boxing for shipment. The use of heavy finishes or saturators to give artificial appearance is not permitted. The pyroxylin must be sufficiently plasticized that it will not crack on a piece of conduit kept three months at room temperature when the conduit is bent back sharply on itself.

Conduit with finish of a higher luster than can be obtained with the two coats of lacquer as specified above shall be considered special and should be covered by other specifications when required.

Conduit Test Standards

Tests.—*(a)* A 6-in. piece of conduit, totally immersed in water at 70 deg. Fahr. for 24 hr., and then blown out with a mild air-current immediately after removing from the water, shall not have an increase in weight of more than 35 per cent.

(b) A 6-in. piece of conduit, totally immersed in an equal mixture of cylinder oil, kerosene and gasoline at 70 deg. Fahr. for 24 hr., shall not swell appreciably and shall not soften more than 20 per cent, nor shall the lacquer finish separate or freely peel from the fabric after this test.

(c) The wall must not collapse when the conduit is bent to a radius of five times the inside diameter at 70 deg. Fahr. The conduit shall be capable of being flattened with a wooden mallet for a length of 6 in. in the center of a longer length and of being restored to roundness by working with the fingers so that a wire of maximum size for which it is normally suitable can be readily introduced. The compound must not crack open in this test.

(d) All conduit up to and including ⅜-in. inside diameter shall be capable of standing a tension of 100 lb. for 5 min. without breaking or opening at any point. Larger sizes must stand 150 lb. The test piece to be 6 in. long between supports.

Fireproofing.—Flame-resisting qualities must be incorporated in the saturator or finish or both, in order to pass the following test:

> The conduit shall not convey fire nor support combustion for more than 1 min. after five 15-sec. applications of a standard test-flame with intervals of 15-sec. between applications. A standard test-flame is the blue flame, about 5 in. high, produced by a ½-in. Bunsen burner fed with ordinary illuminating gas at normal pressure. The conduit must be held vertically with either the lower or the upper end thor-

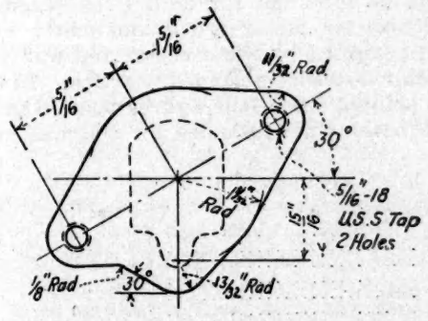
oughly sealed to prevent the passage of air, and the flame must be applied horizontally.

This conduit may be purchased cut to length or in coils, as specified by the purchasing department, and must be properly boxed to prevent loss or injury during shipment.

Mountings For Fuel Pumps

The engine division proposed two mountings for fuel pumps, as recommended practice, one a mounting for reciprocating pumps and the other for rotary pumps. Only the mounting flange on the engine is covered by the proposed recommended practice. At the suggestion of a radiator manufacturer, the division proposed the following addition to its specifications for shell-type radiators, viz.: "the minimum size of the tapped hole for the radiator drain cock or plug shall be ⅜ in. American Standard pipe thread." It is hoped that providing for this comparatively large-sized drain plug will insure better drainage and consequent better cleaning and operation of radiators.

Cancellation of the No. 2 rear support arm was recommended because it is very rarely used and it has sometimes been erroneously thought that this supporting arm was meant to go with the No. 2 bell housing. Cancellation of the recommended practice on mufflers and exhaust pipes was recommended, because mufflers and exhaust pipes are generally designed specially for each particular engine and the "practice" has not been followed in the industry. Similarly the Committee was asked to cancel the standard for engine number location, and the standard for engine tire pump mountings, the latter because engine tire pumps are no longer used.



Dimensional plan of fuel pump mounting flange, reciprocating type

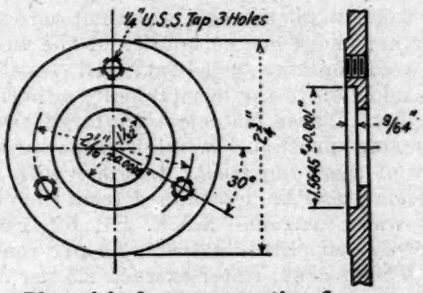
The Iron and Steel Committee recommended that the increase of 0.005 per cent in the permissible sulphur content in all S.A.E. steels, made a year ago, be revoked in the case of steels Nos. 1095, 1350, 1360, X1315, 1112 and 1120; that the manganese range of steels Nos. 4130, 4140 and 4150 be increased from 0.40-0.70 to 0.50-0.80; and that on all basic open hearth alloy steels the silicon range be specified as 0.15-0.30, and on all electric and acid open-hearth steels, as 0.15 minimum, with no upper limit.

A new chrome-vanadium steel of the case-hardening type was recommended, with the following composition:

Carbon	0.10-0.20	Sulphur	0.045 max.
Manganese	0.30-0.60	Chromium	0.80-1.10
Phosphorus	0.04 max.	Vanadium,	0.15 min. 0.18 desired

Two additional steels in the low-alloy medium carbon chrome-nickel class were recommended for adoption, of the following compositions:

No. 3150		No. 3145	
Carbon	0.40-0.50	Carbon	0.45-0.55
Manganese	0.50-0.80	Manganese	0.50-0.80
Phosphorus	0.040 max.	Phosphorus	0.040 max.
Sulphur	0.050 max.	Sulphur	0.050 max.
Nickel	1.00-1.50	Nickel	1.00-1.50
Chromium	0.45-0.75	Chromium	0.45-0.75



Plan of fuel pump mounting flange, rotary type

The Parts and Fittings Division proposed that the following paragraph be substituted for a similar one in the specification on passenger car bumper heights: "The bumper heights specified shall be the mean determined from no-load and full-load position with the car carrying the full amount of gasoline, oil and water."

It also recommended that the specification for bumper height be revised as follows: "The horizontal center-line of the bumper face, exclusive of fittings, shall be 17 in. plus or minus ⅛ in. per inch of effective face above the ground for front bumpers, and 17 in. plus or minus ¼ in. per inch of effective face above the ground for rear bumpers or fender guards."

In view of the differences in design it is desirable to define the point where the bumper face is to be measured, hence the following paragraph was recommended for adoption: "The vertical spread of contact face of bumper assemblies is the distance between the upper and lower edges of the bumper impact-bar or bars and shall be measured at the extreme outer end thereof."

To assure that bumpers will be mounted at the correct angle, which is of importance from the standpoint of appearance, the division recommended that the following be added to the existing specifications: The faces of the mounting pads for the front bumper shall be perpendicular to the ground when the car is unloaded. The faces of the mounting pads for the rear bumpers shall be perpendicular to the ground with the car fully loaded.

A sub-division under the chairmanship of H. R. Wolf of the General Motors Research Laboratories had revised the existing S.A.E standard for felt and the division recommended the following new specifications for this material:

Felt Specifications

Felt is manufactured by matting or felting animal and vegetable fibers. Wool, on account of the minute overlapping surface scales, and crimped or crinkled condition, which gives it elasticity, is used without admixture with other fibers in the highest grades of felt. Varying amounts of cotton may be introduced in the lower grade felts. Hair, on account of its non-felting properties, is not used in the better grades of automotive felts.

The identification of the type and source of the wool fiber is extremely difficult. The best grades of wool fiber are white. Inferior grades are often yellowish and even brown or black in color. The color of the felt is, therefore, in a general way, a check on the quality of the wool used. The white felts are generally made from high-grade new materials. The clear colors produced by dyeing may contain a small amount of clean reworked material, while the grays and blacks generally contain a larger amount of reworked wool. A microscopic examination may be used as a further check on the quality of the wool.

Raw wool contains "wool-fat" and "wool perspiration" in addition to the mechanically adhering impurities or dirt. These materials are largely removed in the scouring process. In high-grade products the presence of these impurities, together with added sizing material, may be determined from the ether, alcohol and water extract. S.A.E. F1, F2, F6 and F10 shall not exceed: Ether extract, 2.5 per cent; alcohol extract, 0.5 per cent; water extract, 2.5 per cent. The lower-grade and darker felts may exceed these values, especially when sizing materials are specified.

Table 1 (not reproduced) gives the per cent of wool and cotton fiber, ash, color and thickness tolerance for the commercial grades of felt used in automotive work.

The hardness of felt is controlled by the weight per unit area. Table 2 (not reproduced) gives the weight per square yard on the commercial thickness and the weight tolerance. Other thicknesses having the same relative weights are available on special order.

All weights shall be based on the thickness of the felt as ordered and no correction in weight shall be made for variations in the thickness of the material received.

In order to facilitate inspection, the purchaser may, on cut washers and similar parts, convert the weights given in Table 2 and specify the weight per 100 pieces.

Felt used for ball and roller-bearing oil retainer washers shall be sheared on both sides to give a smooth finish free from "surface fuzz" or "flock."

The quality, appearance and oil-absorption characteristics may be specified to be in accord with the samples approved by the purchaser.

The wool content may be determined by the following method:

Boil a 2-gram sample in from 60 to 80 cc. of a sodium-hydroxide solution (specific gravity 1.02) under a reflex condenser for 15 min. Wash the residue with distilled water until the sodium-hydroxide solution and saponified wool are removed. Press out the water, dry and weigh.

$$\text{Per Cent Wool} = 100\,\frac{W - 1.05\,w}{W}$$

Where

W = weight of original sample

w = weight of residue

Since hair and other animal fibers similar to wool are saponified and included with the wool, a microscopic examination should be made on the original sample.

General Information.—Back-check, extra-firm-pad and firm-pad felts are recommended for use in washers, bushings, oiling wicks, door bumpers and similar parts. Back check is recommended where light or medium oil is used; an extra-firm pad or firm pad where heavy oil or grease is used.

Soft-pad felt is intended for chassis strips and similar parts.

Colored shoe upper felt is intended for use for ball and roller-bearing oil-retainer washers and for use where an accurate, thin, smooth, high-grade felt is desired.

Asbestos felt is intended for such applications as soft top-padding or cushions.

The Production Division offered an illustration and a table of dimensions for cutters for Woodruff keyslots, which correspond to the Woodruff key sizes submitted by the Parts and Fittings Division.

The Tire and Rim Division recommended cancellation of that part of the present standard on rims for high-pressure tires which relates to passenger car equipment, and a revision of that part relating to commercial vehicle equipment. The revised standard proposed is embodied in the following table:

Pneumatic-Tire Rims for High Pressure Tires

	Tire Sections, In.					
Rim Diameter, In.	5	6	7	8	9	10
20	30x5	32x6	34x7	36x8	38x9	40x10
24	34x5	36x6	38x7	40x8	42x9	40x10
Nominal Rim-Section Width, In.	5	6	7	8	9	10
Maximum-Tire Width on Rim, In.	6.05	6.90*	8.05	9.20	9.85	11.50

* Eight-ply 6-in. tire to be 6.55 in. maximum on 5-in. truck rim.

A new standard for balloon tires and rims for commercial vehicles was also proposed as follows:

Balloon Tires and Rims for Commercial Vehicles

	Tire Sections, In.						
Rim Diameter, In.	6.00	7.00	7.50	8.25	9.00	9.75	10.50
20	6.00-20	7.00-20	7.50-20	8.25-20	9.00-20	9.75-20	10.50-20
22				8.25-22	9.00-22	9.75-22	10.50-22
Nominal Rim-Section Width, In.	5	5	6	7	7	8	8
Maximum Tire-Width on Rim, In.	6.05	6.95	7.75	8.50	9.25	10.05	10.30

A table of spacings for dual tires (high-pressure and balloon) for motor truck and motor coach use had been compiled by the division and was submitted for adoption as a recommended practice. In the table, which is printed below, the figures printed in brackets are combinations not intended for original equipment.

Rim Size, In.	Tire Size, In.	Spacing, Center to Center Tires and Rim, In.
5	5.00	7
5	5.00 [6]	7¾
6	6.00	7¾
6	7.00	8¼
6	6.00 [7]	8⅛
6	7.00 7.50	8⅛
7	7.00	9
7	7.50 8.25	10
7	7.00 [8]	10
7	8.25 9.00	10½
8	8.00	10¾
8	8.00 9.00	11½
8	9.00 9.75	11½
8	9.75 10.50	12
9-10	9.00	12
9-10	9.00 10.00	12¾
9-10	10.50	12¾

A proposed revision of the S.A.E. standard for solid tire base bands included all channel base bands used for solid, cushion, tractor, trailer and industrial truck tires. The design of the corrugations on the surface of the channel between flanges is left optional. The standard width of a solid tire is equal to the nominal width plus or minus one-sixteenth inch and is measured on the inside of the channel at the mean depth of the vertical seat of the rubber.

A list of hollow center cushion tires was presented for adoption as an S.A.E. standard. The table giving these sizes also gives the wheel diameters which the tires fit, the maximum carrying capacities in pounds per tire, and the maximum speeds for which the use

(Turn to page 995, please)

Uniform Bus Specifications *Code* Undergoes *Final Revision*

Automotive interests, public service commissions and railroads reach agreement on national transportation and manufacturing standards.

REPRESENTATIVES of the Society of Automotive Engineers, the National Automobile Chamber of Commerce, the American Electric Railway Association, the American Automobile Association, Federal and Canadian road officials, public service commissions and business papers met in Washington last week and effected the final revision of the Uniform Motor Bus Specifications Code.

The code, published herewith, is the result of a year's work by a committee of the above representatives which set out to formulate uniform bus specifications in the public interest, guaranteeing reasonably permanent, sanitary, safe and comfortable bus transportation.

The effort of the committee will now be concentrated on having the code used as the basis of regulation in all the states of the Union and provinces of Canada. It is not intended that the code be incorporated in the regulatory laws of the several states; it is proposed as a guide for public utility and railroad commissioners in prescribing physical restrictions.

The advantages of a uniform bus code are several. It furnishes the public with reasonable protection from dangers of the service and assures the promulgation of orders that will have due regard for the national development of bus transportation and manufacturing standards of bus makers. In general, free economic progress will be more effective in the development of safer and more reliable buses than is possible under present restrictive specifications that vary with the states. Limits in certain states have been so definitely fixed that the free play of originality in bus design has been absolutely destroyed.

The regulation of bus transportation originates in state legislatures, in the rulings of state highway departments, as these apply indiscriminately to all vehicles using the highways, and by public utility legislation through the medium of quasi-legislative organizations, commonly called commissions. It is primarily with the rules of the latter which apply specifically to bus construction that the Uniform Bus Specifications Code is concerned. These rules are restrictions upon the lengths, widths and heights of buses; the size, color and location of lights; the size, location and mechanical operation of emergency doors, etc., etc. Among these are found the conflicts and irregularities in bus regulation which have been particularly responsible in creating so many difficulties in bus operation and manufacturing.

The preceding reference to conflicts can be defined as the action of one state regulation on one item of construction in direct conflict with the regulation on the same item in a neighboring state. To illustrate: One state requires that every bus shall be equipped with an emergency door located in the center of the rear end of the body; while another requires that it must be located in the rear left side of the body. It is perfectly obvious that a bus cannot legally pass from one to the other of these states. There is need of adjustment when such conditions exist.

Irregularities in bus legislation are those established in one or two states and uncommon to the vast majority of states, wherein a regulation is imposed to safeguard against some remote danger or assumed fault in construction. The sponsors of the uniform code held that such rules are of little use in the primary purpose of regulation, which is the protection of the public, and burdensome in their effect on bus transportation with no compensating advantage to the public.

In framing the Uniform Bus Specifications Code the committee last week carefully analyzed each rule for its ultimate effect upon the public, the operator and the manufacturer from the standpoint of interstate and local service. The result was the revision of 21 of the 31 rules originally submitted, approval of five as they stood and the elimination of five. The rules excluded from the code were those dealing with maximum overhang beyond rear axle; maximum overhang beyond rear end of chassis frame; hinge guards for doors; driver's guard rail, and brakes, In the case of the latter it was deemed advisable to defer the inclusion of a brake ruling pending the results of tests now being made by expert bodies.

A motion was made to incorporate in the code a provision for adequate heating of buses. It was lost with the explanation that the question of heating buses undoubtedly would

come in for considerable study during the next year, and that then would be the proper time to frame a heating ruling.

Most of the changes which the N.A.C.C. felt very strongly should be made had to do with minimum requirements. Some of the minimums suggested in the proposed code would have eliminated, if adopted, the use of small buses made by a number of manufacturers, and of which thousands are in use and other thousands are being put into use annually. The Chamber felt that it was against the public interest to set up any requirement in a uniform code which would condemn and eliminate from use any considerable proportion of motor buses. The fact that thousands of these smaller vehicles have been sold and are in use on lines serving hundreds of thousands of people daily constituted sufficient evidence, in the Chamber's opinion, that the public is satisfied with vehicles of this type in the fields of use to which they are particularly adapted.

Following is the revised Uniform Bus Specifications Code, with some notes, which will be urged for general acceptance through the agency of the National Association of Public Utility and Railroad Commissioners:

The Uniform Motor Bus Specifications Code

Be it known that the . . . . commission of the state or province of . . . . hereby establishes the following rules and regulations for the construction of motor buses to be operated under authority of this commission. These are established under authority delegated in the provisions of Chapter . . . . of the public acts of . . . .

APPLICATION OF REGULATIONS

Unless otherwise specified, regulations herein set forth shall apply to all types of motor buses put into service after this date.

(At the revision meeting this provision was rewritten into a "grandfather's clause," for the obvious reason that many buses now in operation would not be able to comply with many of the requirements of the code.)

DEFINITION OF TERMS

A Parlor Car is a bus designed to carry seated passengers only and having a longitudinal center aisle.

A Sedan Bus is one designed to carry seated passengers only, having full width transverse passenger seats and more than two entrance doors.

A City Type Bus is one designed to carry both seated and standing passengers.

Normal Vision is that which will distinguish clearly with the naked eye or with artificial means the 20-20th line at a distance of 20 ft. (Ocular Nomenclature.)

Atmospheric Conditions under which lighting tests are to be conducted are those which shall be substantially free of fog, rain, snow, mist, dust or smoke. It shall be a condition termed "clear" in weather terminology.

RULE I—Approval for Operation

Every bus regularly operated in any service under authority of this commission must conform to the specifications established by the commission as herein set forth.

RULE II—Maximum Length of Buses

Buses to be approved for operation must not exceed a maximum overall length of 40 ft. The commission, however, reserves the right to further restrict the maximum overall length over particular routes.

(The Hoover code minimum is 33 ft. This figure was incorporated in the rule originally but was increased to allow for developments in bus building and in road construction. The second sentence was added because conditions on certain highways make the operation of a 40 ft. vehicle less safe.)

RULE III—Maximum Width of Buses

Buses to be approved for operation must not exceed a maximum overall width of 96 in. The commission, however, reserves the right to increase the maximum overall width over particular routes.

(A maximum of 102 in. was suggested in view of the tendency to widen highways and the second sentence was added to give the commission discretionary power in this regard.)

RULE IV—Maximum Height of Buses

Buses to be approved for operation must not exceed a maximum unloaded overall height of 14 ft. 6 in.

RULE V—Minimum Headroom

Buses to be approved for operation must have a headroom clearance between the floor and head lining of not less than the following minimum dimensions:

(a) Along the center line of the longitudinal aisle where standees are regularly carried of 74 in.

(b) Along the center line of the longitudinal aisle where standees are not regularly carried of 60 in.

(c) Where there is no longitudinal aisle, as in the full cross seat type of body, headroom measured along the center line of the body to be 54 in.

(Originally this ruling specified clearances individually for city, parlor, sedan and double-deck types of buses. The a-b-c classification was adopted because of the frequent difficulty of accurately defining a bus as to type.)

RULE VI—Ventilation

Buses to be approved for operation shall be constructed or equipped to afford adequate ventilation.

RULE VII—Passenger Stop Signals

Buses to be approved for operation shall be equipped with a passenger stop signal which must be within reasonably convenient reach of each passenger.

RULE VIII—Service Door Specifications

Bus doors used or intended for a regular entrance or exit of passengers shall give a minimum clear opening width of 24 in.; if such doors are non-folding units swung from hinges on one side; the same shall in all cases open outward; if such doors are of double hinged folding type they may open either inward or outward at the option of the owner.

RULE IX—Emergency Doors

Buses to be approved for operation must be equipped with at least one emergency door which shall open outward and conform to the following specifications:

(a) It must be located at or near the rear of the bus body.

(b) It must give a minimum clear opening of 18 in.

(c) It must be so constructed that no obstruction will prevent the passage of passengers through the emergency door.
(d) It must be conspicuously marked on the inside "Emergency Door."
(e) It must give a minimum vertical clearance of 48 in.
(f) It must be provided with a fastening device that may be quickly released in case of emergency, but which shall be protected against accidental release.

(Before being changed the sub-head "a" of this rule stipulated the emergency door must be located "in left side at the rear end of the bus body." Since there is so much difference of opinion in regard to the location of the emergency door the revision "at or near the rear" was agreed upon as permitting each commission to exercise its own opinion. The committee was conscious that "at or near the rear" destroys uniformity but felt it was the best compromise in a circumstance where there is little hope of getting unanimity of opinion.)

RULE X—Destination Signs

Buses must be equipped with at least one destination sign which can be read day or night under atmospheric conditions, as defined, to one of normal vision at a distance of at least 100 ft.

RULE XI—Tail Lamps

Buses shall be equipped with a ruby tail lamp located near an unobstructed position in the lower left hand corner of the rear end of the bus body or firmly attached in the same position to body accessories. It shall be of sufficient size and candle-power to be clearly visible under atmospheric conditions, as defined, to one of normal vision, for a distance at least 500 ft. to the rear of the vehicle.

RULE XII—Registration Plate Illumination

Buses shall be equipped with a separate white lamp or the same as an integral part of the tail lamp located in the rear end of the bus body or firmly attached in the same position to body accessories which shall reflect upon the registration plate so that the same is legible under atmospheric conditions, as defined, to one of normal vision at a distance of 50 ft.

RULE XIII—Spot Lamps

Any bus may be equipped with not more than two spot lamps but they shall be so aimed and used upon approaching another vehicle that no part of the beam will be directed to the left of the center of the road nor more than 100 ft. ahead of the bus.

RULE XIV—Signal Lamps

Buses shall be equipped with at least one signal lamp, red or yellow in color, and connected so as to be automatically lighted when the speed of the vehicle is reduced by application of brakes. This lamp shall be located above the tail lamp but below the top of the middle belt panel or line. It shall be visible under atmospheric conditions, as defined, to one of normal vision at a distance of 500 ft. to the rear of the bus.

RULE XV—Rear Marker or Clearance Lamps

Buses shall be equipped with two rear marker lamps, ruby in color and located near the upper corners of the rear of the bus body to show as nearly as possible the extreme width of the vehicle, yet keeping the lamps in the rear plane of the bus body. These lamps shall be visible under normal atmospheric conditions to one of normal vision at a distance of at least 300 ft.

RULE XVI—Front Identification-Marker Lamps

Each bus not in city service shall be equipped with two front identification-marker lamps, purple in color and located near opposite upper corners of the roof or body indicating the width of the body. These lamps shall be visible when lighted under atmospheric conditions, as defined, to one of normal vision at a distance of at least 500 ft. ahead of the vehicle.

RULE XVI—Front Identification-Marker Lamps

Buses shall be equipped with interior lamps sufficient to give an evenly distributed illumination of at least ¾ rated candle-power per sq. ft. of passenger deck area. The deck area is to be determined by the maximum inside width of the deck and the maximum inside length thereof from the plane of the instrument board to the rear of the bus.

RULE XVIII—Dash Signal Lamps

Sedan buses shall be equipped with an annunciator lamp on the dash which will be automatically lighted when any door is open.

RULE XIX—Step Lamps

Buses, excepting sedan types, shall be equipped with a lamp or lamps so placed that the step or steps at the service doors shall be clearly illuminated when the doors are open.

RULE XX—Space for Passengers

In a city type bus a lineal dimension of 16 in. will be used to determine the seating capacity of seats obviously designed for more than two passengers.

RULE XXI—Aisle Space

City type buses must be so constructed that a radius 14 in. long from the center of the aisle end of any seat shall encounter no obstructing part of the seat or seats on the opposite side of the aisle. Parlor cars must be constructed to fulfill the requirements of this rule with a 9 in. radii.

RULE XXII—Knee Room

Buses to be approved for operation shall have a minimum clearance between the front of the back cushion and the nearest forward obstruction of 24 in. at the seat line.

RULE XXIII—Fuel Tanks

Fuel tanks shall be installed, filled, drained and vented outside of the body shell.

(Fuel instead of gasoline was chosen as the descriptive term in view of the fact that some buses already are being operated on fuel oil and in anticipation of Diesel-type engine developments.)

RULE XXIV—Bumpers

All buses shall be equipped with rear bumpers designed for heavy duty service.

RULE XXV—Exhaust Pipe

Exhaust pipes on all buses shall be extended to the rear end of the bus or to the roof of the vehicle in chimney fashion.

(This rule called for extension of the exhaust pipe to the rear end or to a point immediately in front of the left rear wheel . . . . This second option was eliminated because experience is teaching that this arrangement does not effect the result desired.)

RULE XXVI—Muffler

Buses to be approved for operation shall not be equipped with a cut-out; but they shall have means by which exhaust noise may be reasonably quieted.

NEW DEVELOPMENTS—Automotive

Cincinnati Burnisher

ANNOUNCEMENT has been made by the Cincinnati Shaper Co. of the introduction of an automatic gear burnisher, which has features providing a definite variable time of burnishing, reverse of operations without removing the gear, quick loading and unloading facilities and a number of mechanical refinements such as the adoption of ball bearings and of automatic lubrication.

Cincinnati Shaper gear burnisher in the loading position ready for the green gear

As will be noted from the illustration, burnishing pressure is controlled by counterweights at the end of a lever arm. The illustration shows the burnisher in the loading position, with the three hardened and ground master gears in position ready to receive the green gear to be burnished before hardening.

The operator puts this gear in position, pushes the hand lever down, which brings the green gear into engagement with the driving gear on the upper spindle, and throws the switch starting the machine in the forward direction. After it has made a predetermined number of revolutions, variable from a few seconds to half a minute by means of a dog on a rotating disk, the spindle reverses and makes the same number of revolutions in the opposite direction, stopping automatically at the end of the cycle.

The carriage is raised or lowered by means of a crank, in a manner similar to the adjustment of the knee of a milling machine, to provide for burnishing of gears of different diameter—up to 7 in. on the regular machine, although the burnisher can be supplied capable of handling larger gears. The screw has a micrometer collar for fine adjustments.

The counterweighting for pressure regulation permits a movement of the carriage slide sufficient to compensate for any small variation in the pitch diameter of a run of gears. There is a separate tank with a motor driven centrifugal pump for automatic lubrication of the teeth of the master rolls. A return tube makes circulation completely closed.

A three hp. motor running 1725 r.p.m. is required. Since the motor is mounted well above the floor on the machine tool casting, it should have removable legs. Burnishing rolls are supplied by Pratt & Whitney.

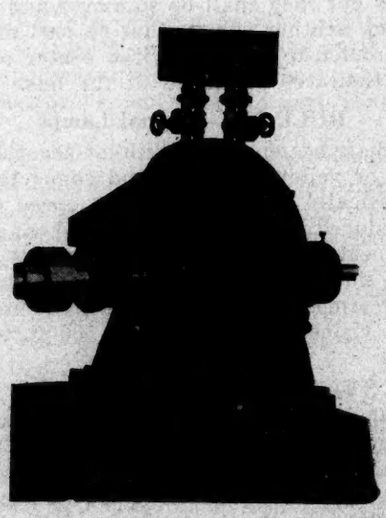
Absorption Dynamometer

AN absorption dynamometer for use in testing aircraft, automobile and other engines is being built by the Murray Iron Works Co., Burlington, Iowa, manufacturer of boilers, engines and turbine-generator units. This dynamometer is built in capacities up to 2000 hp.

It consists of from 1 to 10 disks revolving in compartments formed by a series of diaphragms. Due to rotation of the disks the water when admitted to the casing from the tank at the top of the brake is thrown to the circumference by centrifugal force, where it is held in an annular layer.

As the discharge valves are closed off or the inlet valve is opened (or vice versa), increasing or decreasing the disk surface in contact with the water, the load is increased or decreased. The casing is cylindrical and supported on roller bearings so as to permit rocking and recording the torque on a scale beam.

The main bearings of the dynamometer are deep groove ball bearings for the smaller sizes, and self-aligning turbine bearings with forced lubrication for the larger sizes. The bearing supports are so arranged that all the losses are recorded as load on the scale beam, eliminating all corrections.

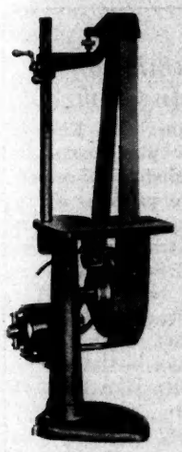


Murray absorption dynamometer

Parts, Accessories and Production Tools

Porter-Cable Irregular Sanders

THE Porter-Cable Machine Co., Syracuse, N. Y., has developed the Syracuse Type B-6 irregular belt sander for use in connection with intricate and irregular parts. Any belt from ½ to 3 in. wide may be used as the work requires. The belt passes over a pad directly above the table, against which the operator works in a manner somewhat similar to operating a band saw. The machine is designed so that any length of belt from 95 to 125 in. may be used.



Syracuse B-6 sander

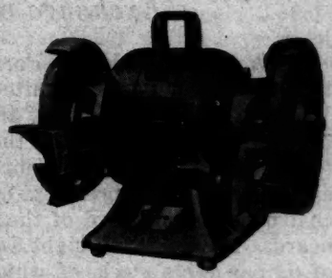
Power is transmitted from the motor to the drive pulley by a belt which, together with the rubber covering on the pulleys over which the abrasive band travels, insures quiet operation. The machine can be furnished in two speeds, 1975 ft. per minute for wood or 3425 feet per minute for metal. Equipment is portable and operates from a lamp socket or power line and uses a ½ hp. ball bearing motor.

Starrett Gage Stock

THE L. S. STARRETT CO., Athol, Mass., announces thickness gage or feeler stock in 25-ft. rolls, ½ in. wide and in thicknesses from 0.0015 to 0.015 in., packed in dirt protecting metal cases. The thickness gage stock is spring tempered and is marked every 6 in. with a line and the thickness. The thickness holder holds any thickness from 0.0015 to 0.025 in., and the last bit can be utilized with no chance of cut fingers. It is especially useful for checking gear play, spark plugs, valve clearances, fitting pistons or any place where certain thicknesses are in constant use.

Van Dorn Portable Grinder

THE Van Dorn Electric Tool Co., Cleveland, Ohio, has developed a 6-in. bench grinder, designed for tool dressing, sharpening hand tools and for all kinds of light grinding. The grinder weighs only 36 lb. and has a convenient handle so that it can be moved easily. Rubber pads are fitted to the base which make it unnecessary to bolt the grinder for light work. The shaft is mounted on ball bearings with dust-proof housing while the motor is completely enclosed and can be operated from the lighting circuit. It is equipped with two 6-in. grinding wheels, wheel guards and tool rests, three-wire cable and plug.



Van Dorn portable electric grinder

S. A. E. Standards Committee Approves Reports

(*Continued from page 990*)

of such tires is recommended. While the table lists 21 sizes, seven preferred sizes are marked by underscoring. Dual tires have twice the carrying capacities of singles. The recommended carrying capacities are for vehicles equipped with springs.

A revision of the table of sizes of solid tires was also submitted. The new table contains 35 sizes, as compared with 22 for the old, but ten of the sizes in the new table are for use on trailers only and are so marked. Of the remaining 25, eight are underscored as preferred sizes. In this case, too, the diameters of the wheels which the tires fit, the maximum carrying capacity in pounds per tire, and the maximum recommended speeds for use with the different sizes are included in the table.

Cancellation of the "general information" on pneumatic-tire rim sections was asked.

In connection with the existing standard on balloon tires and rims for passenger cars, omission of the 5.50-20, the 4.75-19 and the 5.25-18 sizes and the addition of a 7.00-19 size was recommended. On the motion of B. J. Lemon, of the United States Rubber Co., the recommended omission was not adopted, and the three sizes were retained. On another motion by Mr. Lemon, it was decided to omit entirely the old style markings from passenger car tires hereafter.

The division also submitted three tables of tire loads and inflation pressure tables, for truck and bus balloon tires, passenger car balloon tires and truck and bus high-pressure tires respectively.

The Parts and Fittings Division also had revised the standard for Woodruff keys, keyslots and keyways. The arbitrary numbers of the keys were eliminated from the table of sizes, and replaced by fractional inch nominal key sizes. An illustration of the optional type of Woodruff key with a small flat on the bottom was added, together with dimensions for same. One column in the table gives the approximate weight of the keys, in lb. per thousand.

Revised tables were submitted also on dimensions of Woodruff keyslots, key above shaft and keyway.

The same division presented a revision of the standard for split and tubular rivets. A large number of dimensions and tolerances has been added, not previously set on rivets, and this was said to be the first comprehensive standard for such material.

The division also recommended the cancellation of the standard for steering wheel hubs, which is not being used. Manufacturers of steering gears and steering wheels approached on the subject did not seem to favor retention of the standard in revised form.

First with the News

Reliable, Accurate

Automotive Industries News

PAGE 996 VOLUME 60 *Philadelphia, Saturday, June 29, 1929* NUMBER 26

Curtiss-Wright-Keystone Decide on Consolidation

Keys and Hoyt Head Project for Control of Aircraft Manufacturing and Transport Companies; Plan for Exchange of Stock is Announced.

NEW YORK, June 27—Formation of the Curtiss-Wright Corp., a gigantic holding company to unite the Curtiss Aeroplane and Motor Co., the Wright Aeronautical Corp., and the Keystone Aircraft Corp., as well as a number of subsidiaries of the three principals, was formally announced today. C. M. Keys, president of the Curtiss Aeroplane and Motor Co., is expected to become president of the holding company, and Richard F. Hoyt, chairman of the board of the Wright Aeronautical Corp., chairman of its board. The Curtiss-Wright Corp. will be capitalized with 12,000,000 shares of no par value stock, of which 2,000,000 shares will be preference stock entitled to a payment of $2 annually, and which will be convertible share for share into common stock and callable by the company at $40 a share. The remaining stock will be common, and both classes will be entitled to voting privileges in the new corporation.

According to Chester W. Cuthell, general counsel of the Curtiss group of companies, the merger had been under discussion for several years, but it was approved by directors of the Wright and Keystone companies only yesterday, and by directors of the Curtiss company several days ago.

The following table shows the number of shares in the holding company to be exchanged for each deposited share of the indicated merging concerns:

	Class A	Common
Wright Aero Corp.....	1	3¼
Curtiss Aero. and Motor Co.	1	4½
Curtiss Airports Corp.		5/12
Curtiss Flying Service, Inc.		5/6
Curtiss Aero Export Corp...		1.3
Curtiss Caproni Corp.		5/12
Curtiss Robertson Airplane Mfg. Co.		*2
Keystone Aircraft Corp.....	½	1
New York Air Terminals, Inc.		1
New York and Suburban Air Lines		2/5

* After retirement of present stock.

"It is anticipated," says the announcement, "that an offering of stock will be made to holders of both Travel Air Mfg. Co. and the Moth Aircraft Corp. but time has not permitted the working out of the final details of their participation.

"All of the existing organizations and their personnel will be kept intact, and all of the present types of military and naval motors and planes will be continued and developed," the announcement continues.

One million shares of the Class A stock and 6,500,000 shares will be required of the new stock for purposes of exchange, leaving 3,500,000 shares of common available for the acquisition of new units. The present units are among the oldest and largest in the aviation industry. The Curtiss Aeroplane & Motor Co. had assets of $12,385,770, while Wright had assets of $14,670,241 on March 31, and Keystone had assets of $4,642,955 on Dec. 31, 1928.

Wright Discontinues J-5

NEW YORK, June 25—Wright Aeronautical Corp. this week finally discontinued the manufacture of engines of the old J-5 series which have been famous in a number of flights. This series is now replaced by the seven-cylinder J-6 series on which Wright had been working for a considerable time.

Developing Body for Ruxton

CLEVELAND, July 27—At the office of the Baker-Raulang Co. it was stated today that the company is conducting experimental work on a body for the Ruxton front-wheel drive automobile.

Russian Commission Has Buying Office

DETROIT, June 27—The Stalingrad tractor plant commission has established offices at Detroit for the purpose of purchasing machine tool equipment for the new tractor plant factory which the Soviet Russian government will build. The commission is headed by P. S. Kagan, chief engineer, who has a large staff in Detroit representing the Russian government.

Ford Railroad Sold to New York Brokers

DETROIT, June 26—Henry Ford has sold his Detroit, Toledo & Ironton Railroad to C. D. Barney & Co., New York brokers. It is understood that the purchase was made on behalf of undisclosed principals. Reports in Detroit indicate that the newly formed Pennroad Corp. is negotiating for acquisition of the road. The Pennroad Corp. is owned by stockholders of the Pennsylvania Railroad.

Pierce-Arrow is Silent Regarding Five-Day Week

BUFFALO, N. Y., June 26—Executives of the Pierce-Arrow Motor Car Co. declined today to discuss the rumor that the company is going into a five-day week production schedule, further than to say that there was no immediate prospect of its doing so. Pierce-Arrow had a record production day Monday, turning out 76 cars, the greatest number off the assembly line in a single day up to that date. The company is now 2100 units behind in orders.

New Era Names Roberts

NEW YORK, June 26—New Era Motors, Inc., has announced the appointment of J. E. Roberts as general manager. Mr. Roberts has been associated with the industry for 18 years and brings to his new connection a broad experience and a wide acquaintanceship throughout the industry.

Combustion Paper Starts Discussion

Second Session of S.A.E. Summer Meeting Marked by Differences

SARANAC INN, N. Y., June 26—Somewhat of verbal reality was lent today to the "Combustion Session" at the Summer Meeting of the Society of Automotive Engineers, which opened here yesterday and will close Friday evening. It was evoked in the form of a written discussion by R. N. Janeway, of Detroit, a consulting engineer, and Alex Taub, of the Chevrolet Motor Co. Their utterances concerned a paper entitled "Combustion Chamber Design in Theory and Practice," which was read by W. A. Whatmough, of England, a consulting engineer. Eight hundred persons, including 200 women, are attending the meeting.

"To my mind," said Mr. Janeway, "the outstanding feature of Mr. Whatmough's paper is the proof of the astounding backwardness of the art of combustion chamber design as currently practiced by engine designers in England. This is all the more surprising when it is considered that English scientific workers, such as Clerk, Dixon and Hopkinson, pioneered in the study of engine combustion."

At another point in his paper Mr. Janeway read: "From the illustrations given in Mr. Whatmough's paper, I can see how this condition may occur in actual engines, but if it were not for these illustrations I would have difficulty in believing that anyone could design an engine and still be allowed to practice his nefarious trade. Certainly I know of no such example in American engine design, even at its worst."

In conclusion, Mr. Janeway read: "Mr. Whatmough has presented no research data in support of his contentions, but merely the net results of wholesale changes in design. It is in the interpretation of such results that the investigator is misled into false theories that bar the way to progress."

Mr. Taub opened his paper with this paragraph: "Mr. Whatmough is to be congratulated upon his obvious decision to write this paper in a language fairly common to all of us. Heretofore his writings have been found difficult, due to his remarkable ability to play with words."

Two articles by Mr. Janeway on combustion chamber design appeared a few months ago in *Automotive Industries*. Mr. Whatmough criticized statements contained in Mr. Janeway's articles in a letter published in the *Automobile Engineer*, an English publication; afterward, he was invited to the Summer Meeting to read a paper on the subject.

Announcement that Edward P. Warner, former assistant secretary of the Navy for Aeronautics, who has accepted the editorship of *Aviation*, would be named for the presidency of the Society of Automotive Engineers, was made today He will be the first aeronautical man to become president of the society. The nomination is tantamount to election.

Mr. Warner is 35 years old, and has been professor of aeronautical engineering at the Massachusetts Institute of Technology since 1924. He is the holder of the medal of the Aero Club of France for the best technical work in aeronautical engineering for 1927.

Brockway-Autocar Merger Denied by Both Parties

NEW YORK, June 26—Martin A. O'Mara, president of the Brockway Motor Truck Corp., stated today that he knows nothing of plans for merging of his company with the Autocar Co., of Ardmore, Pa. Reports in financial circles indicate that heavy stockholders in Brockway are acquiring large holdings in Autocar. Whether this may eventually lead to merger seems uncertain.

PHILADELPHIA, June 26—Inquiry at the office of the Autocar Co., Ardmore, Pa., concerning possible merger of the company with the Brockway Motor Truck Corp. brought out the following statement:

"It has been brought to our attention that a rumor has appeared in the press to the effect that the Autocar Co. is contemplating a merger with the Brockway Motor Truck Corp. These statements were issued without our knowledge or sanction and are entirely unauthorized."

Chance-Vought Sets Record

NEW YORK, June 24—The Chance-Vought Corp., airplane manufacturing subsidiary of United Aircraft & Transport Corp., has broken all its records for airplane production and sales both for the month of May and for the first five months' period, with net sales for May of approximately $380,000 and of $1,113,500 for the five-months' period. May sales were 61 per cent greater than last year, while for the five months a corresponding gain of 64 per cent was shown.

Ford to Enlarge Plane Plant

DETROIT, June 25—The Ford Motor Co. plans to enlarge its airplane factory at Dearborn, Mich., increasing the floor space 155 per cent and making possible production of one trimotored all metal air transport a day.

New Fordor Sedan Out

DETROIT, June 25—The Ford Motor Co. has introduced a new two-window type Fordor sedan which features a metal rear quarter. The rear quarter of the former model was leather trimmed. Aside from this change the exterior appearance of the car remains the same.

Record June Output Appears as Certain

Manufacturers Declare Sales Justify Present Activities at Factories

PHILADELPHIA, June 29—The production of automobiles and trucks during the last few days of June is being maintained at a rate that makes virtually certain the prediction appearing in *Automotive Industries* last week to effect that the total output this month would exceed that of any previous June. While, of course, there has been a decline since the all-time production record was established in April, this recession has been far less pronounced than that of former years, and it appears that the output this month will exceed by a considerable margin most of the previous estimates.

Automobile manufacturers as a whole say that no clouds are to be seen on the business horizon and report that retail sales continue at a satisfactory rate which justifies the production now being maintained by the industry. It is certain, however, that the principal manufacturers are watching the new car stock situation vigilantly and it is certain that as soon as there is any pronounced backing up of new car stocks in the field, a curtailment of production sufficient to bring about an adjustment is to be expected.

July production will get away to a slow start because of the holiday in the first week of the month. A majority of the automobile factories will close on the night of July 3 and will not resume activities until July 8, thus affording employees a vacation over the week-end. A number of students of production trends believe that the output next month will show a decline more pronounced than the gradual seasonal tapering of the past several weeks. Reports from a number of parts manufacturers, however, tend to show that the output next month will be maintained at a high level compared with the same month in previous years.

G.M. Men Returning

NEW YORK, June 26—General Motors Overseas managing directors who had been here attending the managing directors' conference held at Shawnee-on-Delaware May 22 to 30, and later making a tour of General Motors operations in the United States and Canada, have been returning to their posts this week.

Columbia to Speed Cord Axles

CLEVELAND, June 26—The Columbia Axle Co. is speeding the production of front-wheel drive assemblies for the new Cord automobile. The work on these units has been under way for several months, Edwin H. Parkhurst, vice-president said, announcing that heavy production is to be started July 1.

Oil Engines Topic at Joint Meeting

Papers on High Speed Diesel Engines Presented at First Day's Session

STATE COLLEGE, PA., June 27—The third annual Oil Power Conference of Pennsylvania State College and the second national meeting of the Oil and Gas Power Division of the American Society of Mechanical Engineers held from June 24 to 27 at State College, Pa., was featured by a number of papers on high-speed Diesel engine development, the first day's session being entirely devoted to this subject. Subsequent papers dealt with refinements in Diesel powerplants, operating costs and standardization of engine ratings and oil specifications. Over 200 A.S.M.E members and guests were in attendance. The address of welcome was presented by Dean R. L. Sackett who acted in the absence of Dr. R. D. Hetzel, president of the college.

The first day's sessions included one in the evening. In all, four papers were presented. One by Otto Nonnenbruck, chief engineer, De LaVergne Machine Co., on "High-Speed Oil Engine Design," summarized the specifications and performance of various successful types of Diesel engines for stationary, marine, automotive and aircraft purposes, and compared the weights and other characteristics suitable for these applications.

This was followed by "High-Speed Engine Pumps and Injection Valves," by J. L. Goldthwaite of the Allison Engineering Co., of Indianapolis, a company well-known in the automotive field for its supercharger development. Mr. Goldthwaite briefly reviewed previously existing knowledge concerning injection valve design and then presented details of some of the problems incident to the further development of later types.

A paper considered to promise a material influence on future Diesel engine development work was that by W. F. Joachim, formerly of the National Advisory Committee for Aeronautics and now associated with the Westinghouse Electric & Mfg. Co. Mr. Joachim propounded a theory of fuel spray combustion which, though speculative to some degree, represents one of the few contributions of thoroughly original study available on this subject at the present time.

Mr. Joachim's paper was followed by a paper on "Commercial Application of High-Speed Oil Engines" by Chester H. Gibbons of the Marion Steam Shovel Co. Papers on the second and subsequent days were given by engineers prominent in oil engine manufacture, and in research work.

Running concurrently with the meeting was a series of exhibits of pyrometers, fuel level gages, injection systems, compressor valves and other equipment suitable for use with oil engines. A golf tournament, picnic and other entertainments were provided for those present.

Central Alloy to Expand

MASSILLON, OHIO, June 22—Directors of the Central Alloy Steel Corp. have authorized an appropriation of $450,000 for improvement of the local sheet mill, which turns out steel for the automotive industry.

An increase of more than 15 per cent in shipments of the corporation during the first five months of this year was made over the first period of 1928, it was announced.

During the five months the value of shipments totaled $31,268,683. Shipments for the same period of last year totaled $31,000,000.

Packard Earnings Rise

DETROIT, June 24—Net income of the Packard Motor Car Co. for the nine months ending May 31, was $23,473,684, equal to $7.82 a share compared with $17,803,304, or $5.92 a share for the same period last year.

For the quarter ending May 31, net income amounted to $8,091,523, or $2.70 a share, against $7,087,303, or $2.36 in the preceding quarter, as compared with $7,662,769, or $2.55 a share for the same quarter last year.

Dumping Duties Removed

WASHINGTON, June 27—Australia has removed the dumping duties assessed on automotive imports from Germany, Austria, Belgium, Czechoslovakia, Hungary, Luxembourg, Portugal and Spain because of depreciation in the currencies of these exporting countries, according to reports from Sydney received this week by the Department of Commerce. The removal of the duties became effective April 16 and 22, it was stated.

Robbins Ending Body Output

INDIANAPOLIS, IND., June 22—Robbins Body Corp. announced last week that by the end of the month, all their contracts for manufacture of automobile bodies would be completed and that the company would devote its full time to the manufacture of radio cabinets, as decided Feb. 1. Production of radio cabinets has already reached 1500 a day.

Buettner Denies Report

CHICAGO, ILL., June 22—Walter E. Buettner, treasurer of the Bendix Aviation Corp., today denied a report that the corporation was negotiating for the purchase of any part of the Irving Air Chute Co., Inc. He said, at the same time, that no negotiations were under way with any parachute company, and had not even been considered.

Edward S. Davis Dies

DETROIT, June 25—Edward S. Davis, 48 years old, president of the Davis Tool and Engineering Co., died June 24 of heart disease.

Business in Brief

Written by the Guaranty Trust Co., New York, exclusively for AUTOMOTIVE INDUSTRIES.

NEW YORK, June 27—During last week retail sales increased in most sections throughout the country. Sales of holiday and sporting goods were especially good. On the whole, trade and industry are making a very good showing for this time of year. The very hot weather has benefited the crops in some parts of the country, but in the Northwest the lack of rain has been a drawback.

CONSTRUCTION CONTRACTS

Construction contracts awarded during May in 37 Eastern States amounted to $587,765,900, according to F. W. Dodge Corp. This total compares with contracts amounting to $668,097,000 awarded in May, 1928. Contracts awarded in the first five months of this year amounted to $2,485,655,700, as compared with $2,796,301,300 in the corresponding period last year.

FREIGHT CAR LOADINGS

Railway freight car loadings for the week ended June 8 totaled 1,054,792 cars, which marks an increase of 59,222 cars over those in the corresponding week last year and an increase of 26,425 cars over those in the corresponding week two years ago.

FISHER'S INDEX

Professor Fisher's index of wholesale commodity prices for the week ended June 22 stood at 97.6 as against 96.6 the week before and 95.8 two weeks before.

BANK DEBITS

Bank debits to individual accounts outside of New York City for the week ended June 19 were 1 per cent above those in the similar week last year.

STOCK MARKET

The stock market last week showed continued strength. Although there were a few downward reactions, the general tendency was upward. Public utility issues were particularly buoyant, while there were considerable advances among the railroad stocks. The volume of sales was fairly large. Call money remained at 7 per cent throughout the week.

BROKERS' LOANS

Brokers' loans in New York City for the week ended June 19 increased $136,000,000, bringing the total up to $5,420,000,000, as compared with $5,793,000,000 on March 20.

FEDERAL RESERVE STATEMENT

The consolidated statement of the Federal Reserve banks for the week ended June 19 showed decreases of $27,100,000 in holdings of bills bought in the open market, of $30,400,000 in holdings of government securities, and of $36,500,000 in member bank reserve deposits. There was an increase of $25,200,000 in holdings of discounted bills. The Reserve ratio on June 19 was 75.8 per cent, as against 75.2 per cent a week earlier.

Fewer Steel Orders as Output Stays High

Seasonal Decline Gradual; Backlogs Reduced, and Prices Continue Firm

NEW YORK, June 27—The output of the steel industry is running ahead of shipping orders received from automotive consumers, and backlogs are beginning to shrink from day to day, the recession in demand being orderly and gradual. Prices are holding steady, if not firm, all along the line with the possible exception of black sheets in which even at the height of the demand more or less irregularity was noted. Occasionally a round tonnage of blue annealed sheets is booked at a slight concession under the general market price, but nearly always special circumstances are responsible for this. Full-finished automobile sheets top the list in point of firmness.

While makers of hot and cold rolled strip steel are not as hard pushed for shipments as they were at the beginning of the month, they are operating under much more satisfactory conditions than they have heretofore been accustomed to at this time of the year. Third quarter contracts are being placed quite freely, and strip mills look for a very active demand over the year's second half. Shipping orders for cold-finished steel bars have declined somewhat, but mills have a very fair quota of third-quarter business on their books.

Automotive alloy steel makers also have booked a very encouraging amount of third-quarter contracts, and moreover have received a large number of specifications for small size billets and slabs which will take bar prices after July 1. The semi-finished steel market is falling in line with that for finished products, and sales of sheet bars, billets and slabs at $35 are reported, the recently named price of $36 having apparently been withdrawn by leading producers. Quite a little contracting for bolts and nuts at unchanged prices is reported.

Pig Iron—Although a good many automotive foundries continue to buy from hand to mouth, a very fair volume of third-quarter contracts has been placed. In Michigan, the price for foundry and malleable iron remains at $20. The Valley market is quiet with foundry quoted at $18.50 and malleable at $19.

Aluminum—Moderate activity is noted at unchanged prices. Manufacturers of secondary metal have organized the Aluminum Research Institute which will study both marketing and technical problems. According to Berlin advices, the Soviet Government bought in England 3000 tons of aluminum on the basis of payment in six months.

Copper—Slightly better interest is noted on the part of consumers who still have to provide for part of their July requirements. On the whole the market, however, continues quiet at prices entirely unchanged.

Buenos Aires to Try Novel Parking Plan

WASHINGTON, June 27—Buenos Aires has struck upon a novel plan for solving its downtown parking problem, according to the Department of Commerce. The mayor of the city has sent an ordinance to council under which buildings, the basements of which are opened for parking purposes, will be exempt from street cleaning and lighting taxes for a period of eight years.

Tin—A firm tone is in evidence. While there appears to be sufficient opposition to the "stabilizing" plans of the Cartel to make consummation of this ambitions project rather doubtful, the market was due for a reaction and this incident made for somewhat more aggressiveness on the part of the London bull contingent. End of the month statistics are not expected to show any marked change in the metal's statistical position.

Lead—Demand is fair with prices unchanged.

Zinc—Quiet and steady.

World 1928 Output Exceeds Old Record

WASHINGTON, June 26—Exceeding 1927 production by more than 1,000,000 cars, the total output of automobiles the world over during 1928 set a new record, according to a survey just completed by the Automotive Division of the Department of Commerce and made public today. The total number of motor vehicles produced in the world last year was 5,203,139 as compared with 4,158,966 in 1927, 5,035,204 in 1926, and 4,892,797 in 1925. Manufacturers of the United States and Canada produced 88.4 per cent of the total output last year, according to the survey.

"More than 55 per cent of the total production was used for replacements, as compared with approximately 50 per cent in 1927, 37 per cent in 1926 and a similar percentage in 1925," says the Automotive Division.

Muskegon to Enlarge Plant

NEW YORK, June 25—Muskegon Motor Specialties Co. has organized a plant expansion program which will increase the capacity of the company by approximately 50 per cent. This action was recently authorized by the board of directors. Plant expansion will be financed entirely out of earnings. F. L. Flanners, chairman, stated that any possible slowing up in production of camshafts in the automotive branch during July and August should be more than compensated for by increased requirements in specifications of camshafts for industrial engines and aircraft uses.

Atterbury Making New Truck Series

Marathon Sixes Are Introduced in 2½, 3 and 4-Ton Capacities

BUFFALO, June 27—The Atterbury Motor Car Co. has announced a new series of trucks of 2½, 3 and 4-ton capacities, known as the Atterbury Marathon Sixes. Streamlining and lowness are effected by a narrow, high hood, with horizontal louvers, coupe type cab and long low chassis.

The engine is of the overhead valve type, developing 70, 80 and 90 hp., in the 2½, 3 and 4-ton models, respectively, with bore and stroke dimensions, in the same orders as follows: 4 by 4⅛ in., 4 by 4½ in., and 4⅛ by 4⅜ in. Full pressure lubrication is employed. The fan is driven by a silent chain which also drives the camshaft and generator.

The 2½ and 3-ton models are equipped with Lockheed four-wheel hydraulic brakes, energized by a vacuum booster. The 4-ton model is equipped with mechanical rear-wheel brakes and also has the vacuum booster. Budd steel disk wheels are standard equipment on all three models, and a special underslung tire rack is provided under the rear end of the chassis. Heavy duty pneumatic tires are standard equipment with dual rear wheels.

Finland Imports Fewer Cars

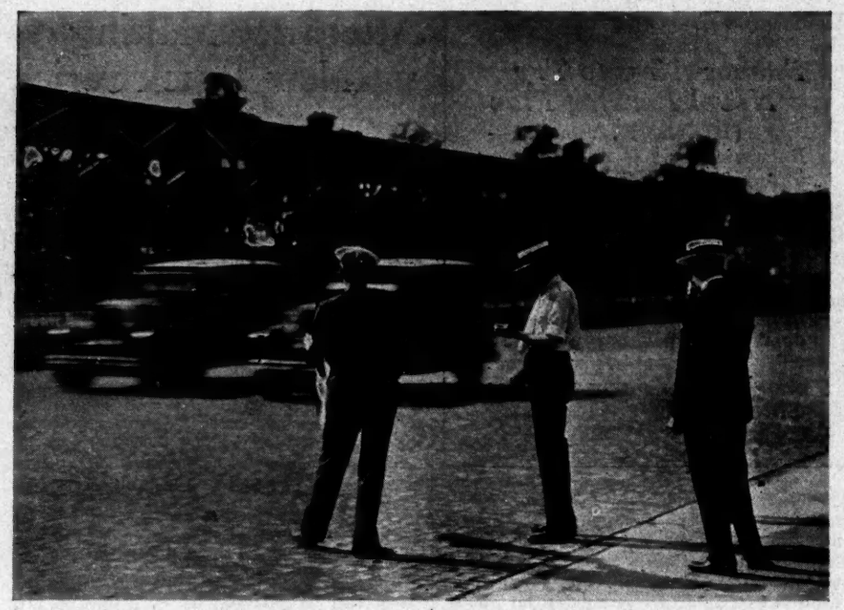
WASHINGTON, June 27—Despite increased purchases for April, Finland's automobile imports thus far this year are lower than those for last year, according to a report issued this week by the Department of Commerce. Imports for the first four months of this year show 1105 complete vehicles and 789 chassis, or a total of 1894 vehicles against, respectively, 1492 and 878, or a total of 2170 vehicles in 1928, a decrease of nearly 300, says the department.

Stutz Announces Increase

INDIANAPOLIS, June 24—Col. E. S. Gorrell, president of the Stutz Motor Car Co. of America, Inc., has announced an increase in business of 95 per cent over May, 1928, and a consistent production increase over April. The factory now has 48 per cent more unfilled orders on file than at this time last year. He adds that Stutz has shown a 50 per cent increase over last year for the period from Jan. 1 to May 31, with an export increase of 34 per cent for the same period.

Syrian Market Improves

WASHINGTON, June 27 — The United States sent 362 trucks and 931 cars to Syria last year as compared with 79 trucks and 640 cars in 1927, the Automotive Division of the Department of Commerce announced this week.



Charles Merz, of the A.A.A. (left), A. R. Heiskell, vice-president and secretary of the Marmon Motor Car Co., and G. M. Williams, Marmon President, (right), are shown observing the Roosevelt endurance tests at Indianapolis

Roosevelt Sedans Shatter Endurance Records

INDIANAPOLIS, June 27—Two of the three record-breaking Roosevelt sedans from the Marmon factory were still running on the Indianapolis Motor Speedway, in an endurance test which had been extended to more than two weeks as this issue of *Automotive Industries* went to press. The first two cars, stock models selected by officials of the American Automobile Association, were started on June 12, a third following 48 hours later. On June 19 the first two passed the endurance record of 172 hours, 32 minutes and 1 second set by R. L. Robbins and James Kelly, of Fort Worth, Tex., in an airplane recently. Both aviators were at the speedway at the time the new record was made. One of the leading cars was disqualified June 22, after 231 hours of continuous travel. Although official reports are lacking, drivers' reports indicated that the first car had traveled more than 10,000 miles by June 26.

Hoagland Silent on Hayes Merger

DETROIT, June 25—When interviewed today regarding a newspaper report that the Hayes Body Corp. was involved in merger negotiations with another independent body manufacturer, W. W. Hoagland, president of Hayes, stated to a representative of *Automotive Industries* that he could neither confirm nor deny the story and that it was premature.

Mr. Hoagland denied at the same time that his company was interested in acquiring a metal stamping plant, pointing out that the company already has a plant of this kind, although perhaps not as large as the company would like to have. He had no further statement to make at the time.

Stewart Announces Truck Body

BUFFALO, June 26—The Stewart Motor Corp. has announced a new special custom de luxe panel body, built with 7-ft. loading space for the ¾-ton chassis and 8-ft. loading space for the 1-ton and the 1¼-ton chassis. Standard equipment includes saddle lamps, two dome lights, rear-view mirror and windshield wiper. Bumper and bumperettes are furnished at extra cost. The prices for the 7-ft. and 8-ft. lengths are $780 and $800, respectively.

Midland Steel to Expand

CLEVELAND, June 25—The Midland Steel Products Co., will expend $500,000 for increasing its plant capacity in Detroit for the manufacture of front-wheel brake units, according to E. J. Kulas, president. The company recently announced that it would restrict its production to automotive parts, beginning Jan. 1, 1930.

Chandler Co. Dissolved

COLUMBUS, OHIO, June 24—Papers have been filed with the secretary of state of Ohio, dissolving the Chandler Motor Car Co., of Cleveland, chartered Nov. 5, 1915, which was absorbed by the Hupp Motor Car Corp.

Oliver Ames

Oliver Ames, senior member of the board of directors of the General Electric Company, died at his home in North Easton, Mass., on June 18. Mr. Ames, 65 years old, had been a member of the board since 1893.

Huge Saving Seen in Freight Rates

Macomber, of Detroit, Says Annual Gain of $2,000,000 is Likely

DETROIT, June 26—As a result of the non-discriminatory freight rates ordered by the Interstate Commerce Commission, the automotive industry, which uses enormous quantities of steel, stands to save hundreds of thousands of dollars annually. Commenting upon the decision, L. G. Macomber, director of the Traffic-Transportation Department of the Detroit Board of Commerce, said that, based on actual tonnage statistics supplied by Detroit's industries using iron and steel, for 1926, the latest for which the data is available, the saving would be $2,052,774 annually.

The new rates, which must be published by the railroads by Oct. 20, were ordered following hearings before the commission at various times. Besides saving money for the automotive industry they will have the effect of increasing mileage scales between points that formerly had a relative advantage over Detroit. The traffic department of the National Automobile Chamber of Commerce, and the traffic department of the Detroit Board of Commerce took an active part in all the hearings.

Winton Engine Co. Earns $81,925 in May

CLEVELAND, OHIO, June 25—The Winton Engine Co. today reported earnings for May of $81,925 after all charges. For the first five months ended May 31, earnings were $300,300 after all charges including depreciation, taxes and interest on debentures of $26,761. These debentures have since been retired.

The earnings are equal to more than $10 a share for the 5-month period on the 30,000 shares of preference stock outstanding against the entire year's requirements of $3 per share. After dividends on the preference stock there remains for common stock $4.04 a share, which is at the annual rate of approximately $9.60 a share.

Berliner-Joyce Opens Plant

NEW YORK, June 22—The Berliner-Joyce Aircraft Corp. of Baltimore has opened its new fireproof factory at Dundalk, Md., adjacent to the Baltimore municipal airport. Offices of the company have been moved to this building and factory equipment from the old plant at Alexandria, Va., has been transferred to this new plant.

Standard Forms New Division

DETROIT, June 24—The Standard Malleable Iron Co. of Muskegon, Mich., has formed a nut division to be known as the Standard Self Lock Nut Co. The new division is making a special patented lock nut.

Michigan Aero Corp. Formed at Lansing

Harper, Lundberg and Potter Head New Manufacturing Project

DETROIT, June 24—The Michigan Aero Corp. has been formed at Lansing, Mich., by Hugo Lundberg, Harry F. Harper and Ray Potter. The company is incorporated for 10,000 no par shares, and will engage in the manufacture of airplanes and airplane engines. Mr. Harper is president of the Motor Wheel Corp., and Mr. Lundberg is an executive of the Federal Screw Co., which recently established an aeronautical division to manufacture Rover engines. Both men are also interested in the Driggs Aircraft Corp., of Lansing, which manufactures airplanes.

Whether the new company will take over the manufacture of the Rover airplane motors and the Skylark planes, which are made by the Driggs company, has not been revealed, executives of the corporations concerned remaining silent on the subject.

Roumanian Duties Changed

WASHINGTON, June 27—Roumanian import duties on motor cars are now based on net instead of gross weight, says a report received by the Department of Commerce from its Bucharest office. Net weight is defined, says the report, as the weight of the car with all such accessories as may be necessary for its regular functioning and other accessories pay duty under separate tariff items. The packing of the car is also dutiable under separate items.

Exports to Paraguay Rise

WASHINGTON, June 27—Paraguayan automobile exports from the United States last year numbered 264 as compared with 147 the previous year, an increase of 80 per cent, according to the Automotive Division of the Department of Commerce. The American automobile dominates the Paraguayan market, all of the 1500 cars registered, except 18, being of American manufacture, says the department.

Ohio Second in Fuel Use

COLUMBUS, OHIO, June 22—Ohio, which has the third largest number of automobiles of any of the states, was second in gasoline consumption in 1928, according to figures compiled by the Ohio Good Roads Federation. Gallons of gasoline consumed in this state by motor vehicles in 1928 totaled 860,632,825, a 12 per cent gain over the previous year.

Bach Assembly Plant Burns

DETROIT, June 24—The assembly plant of the Bach Aircraft Co., Inc., factory, at Los Angeles, Calif., valued at $80,000, and two $36,000 10-passenger planes, were burned Thursday in a fire, which started from a workbench soldering iron. The main manufacturing plant, adjoining the burned building, was not damaged.

Kreider Increases Schedule

NEW YORK, June 25—The Kreider-Reisner Aircraft Co., Hagerstown, Md., has set up a production schedule for July of 75 sport biplanes. Original schedule for the month was 15 planes but increased demand made necessary progressive advances in this schedule until it has now been set at 75 planes. A new building has recently been added to the plant.

Bumper Merger Assured

DETROIT, June 25—Deposits of General Spring Bumper Corp. capital stock under the plan and agreement which proposes combining the business of Houdaille-Hershey Corp. and General Spring Bumper Corp. now total an amount sufficient to insure the success of the plan, according to Claire L. Barnes, president of both companies.

Ajax Trenton Plant Sold

TRENTON, N. J., June 26—The Trenton plant of the Ajax Rubber Co., Racine, Wis., has been sold to T. Arthur Karno, and others of Trenton. The plant was held at $500,000 and covers six and a half acres of land. The new owners will endeavor to dispose of the plant to a tire manufacturing concern.

Kent Buys Newark Site

NEW YORK, June 22—Kent Garage Investing Corp., which has erected an automatic parking garage in New York and has a second one under construction in this city, has purchased a block in Newark for the erection of a similar garage there. The building will be 20 stories high and have a capacity of more than 700 cars.

Brown & Sharpe Co. Formed

PROVIDENCE, R. I., June 22—The Brown & Sharpe Co. has been organized to handle sales of machinery and tools manufactured by the Brown & Sharpe Mfg. Co., for the Detroit, Cleveland, Cincinnati and Chicago territories. The home office of the new company will be in Providence and its operations will begin as of July 1.

Seek Data on Hearse Bodies

WASHINGTON, June 27—Catalogues and prices from American builders of hearse bodies are being sought by the Guatemala City office of the Department of Commerce, it was announced this week.

Detroit Sheet Metal Moves

DETROIT, June 24—The Detroit Sheet Metal Works, fabricating the industrial ovens for the automotive industry, have moved to their new and larger plants here.

Allied Motor Holders to Get Cirrus Stock

Indications are That Merger Will Follow Completion of Exchange

CHICAGO, June 26—Completion of negotiations for the acquiring of American Cirrus Engines, Inc., by Allied Motor Industries, Inc., is implied in a published statement to the effect that stockholders of Allied Motor Industries, and its subsidiaries, the Great Lakes Aircraft Corp., and the Van Sicklen Corp., will have an opportunity to subscribe for stock in American Cirrus in proportion to their holdings in Allied companies.

Rights for this purpose will be extended to holders of common and preferred stocks of Allied Motor Industries, according to an announcement by W. R. Wilson, president of Allied Motor Industries, and to holders of the Class A stock of Great Lakes Aircraft and Van Sicklen Corp., and will be in the ratio of one unit of American Cirrus stocks for each share held in Allied Motor Industries or the subsidiary companies. The units consist of one share of Class A stock and one-quarter of a share of Class B stock and will be priced at $21 a unit. According to information on file at the Chicago Stock Exchange the rights accrue to stockholders of record June 27 and expire July 21.

American Cirrus Engines, Inc., holds rights of sale and manufacture throughout the United States of the Cirrus engine, a British patent. The company has a plant at Belleville, N. J., and has arranged a straight-line production schedule of 10 engines per day. The capital structure of the company consists of 150,000 shares of Class A stock and 300,000 shares of Class B stock. The Class A stock is preferred in regard to dividends of $1.50 a share annually, after which the two classes share equally in dividends. The Class A stock is non-voting.

Thermoid to Build

TRENTON, N. J., June 26—The Thermoid Co., has let a contract for the erection of a double section addition to its plant. The building will be one-story, 100 by 170 ft., fireproof construction, brick, steel and concrete. The new addition will be used for the manufacture of asbestos brake lining and special equipment and machinery will be installed.

Rolls-Royce Operating at Peak

SPRINGFIELD, MASS., June 27—Rolls-Royce of America, Inc., is operating its plant here at the highest production in its history, operations being more than 50 per cent ahead of a year ago. The Brewster coach works division at Long Island City is producing at a corresponding rate.

Men of the Industry and What They Are Doing

Banquet Honors Conn; Hodges Chief Speaker

To honor George C. Conn, who is retiring July 1 as director of traffic of the Buick Motor Co., a banquet was held in the Hotel Durant, at Flint, and was attended by 400 representatives from railroads, industrial traffic organizations, the Interstate Commerce Commission, and the American Railway Association.

E. N. Hodges, traffic manager of the Hupp Motor Car Corp., who was one of the speakers, paid glowing tribute to Mr. Conn and, on behalf of his large circle of friends, presented a silver serving set to Mr. Conn and his wife. More than 50 railroads sent executives to the dinner.

Oostdyk Leaves Hudson

Charles A. Oostdyk, director of purchases of the Hudson Motor Car Co. for the past 12 years, has resigned, effective July 1. Mr. Oostdyk entered the employ of the Olds Motor Works about 25 years ago, and in that period, has been associated with the Cadillac Motor Car Co., as purchasing agent, and with General Motors Corp. in sales work, before his connection with Hudson.

Klingler Honored by Dealers

NEW YORK, June 25—Chevrolet dealers from the New York and Tarrytown zones to the number of 1000, yesterday held a luncheon at the Commodore in honor of H. J. Klingler, recently appointed vice-president and general sales manager of Chevrolet Motor Co. Mr. Klingler succeeds R. H. Grant, recently elected vice-president of General Motors Corp.

Haynes Speaks at Dinner

Frederick J. Haynes, former president of Dodge Motor Co. and now president of the Durant Motors, Inc.; R. T. Hodgkins, general sales manager, and R. V. Cary, truck executive of the company, were principal speakers at a recent dinner arranged by William Shanemeyer, president of the Illinois Valley Motor Co. last week in the Hotel Pere Marquette attended by 140 dealers, field men and bankers.

Anderson Succeeds Latto

The National Acme Co. has announced the appointment of Willard A. Anderson as manager of its eastern office, 117 Liberty St., New York City, to succeed Harry T. Latto, who resigned recently. Mr. Johnson has been with the company for several years.

Fisher's Plane Carries Party

Lawrence P. Fisher's new $100,000 Fokker airplane was pressed into service recently to carry a party of General Motors executives from Detroit to Flint. In the party was Alfred P. Sloan, Jr., president of General Motors; Donaldson Brown, Fred Fisher, W. A. Fisher, Alfred Fisher and Lawrence P. Fisher, all vice-presidents of General Motors, and Harley Earl, head of the design and color division of Fisher Body, was also in the party which visited the Buick and Marquette plants.

Sauveur to Give Lecture

Dr. Albert Sauveur, Gordon McKay Professor of Metallurgy and Metallography in Harvard University and dean of American metallurgists, has accepted the invitation of the board of directors of the American Society for Steel Treating, to present the E. D. Campbell Memorial Lecture for 1929. This lecture was established by the directors of the A.S.S.T. in 1926 to perpetuate the memory of Dr. Edward DeMille Campbell, of the University of Michigan.

Blees Heads Motor Accounting Co.

William Blees, who has been in charge of the dealer accounting division of the Chevrolet Motor Co., has been promoted to president of the Motor Accounting Co., a division of General Motors Corp. Mr. Blees has been with Chevrolet five years, during which he has done sales promotion and used car work in the sales division, and more recently in charge of the accounting division.

Barnes and Snyder Promoted

Herbert Barnes, for the past two years a district representative for the Chevrolet Motor Company in the Indiana zone, has been appointed assistant zone sales manager at Charleston, W. Va.

Floyd Snyder, formerly assistant zone manager in the Indiana zone, who was transferred to the same position at Charleston about the first of this year, has been made zone manager of West Virginia, according to the announcement.

Sage Returns From Europe

N. R. Sage, export manager of the Russell Mfg. Co., Middletown, Connecticut, has just returned from a two months' trip covering some of the major Rusco outlets in Europe. Mr. Sage traveled France, Spain, Portugal, Italy, Switzerland, Germany, Denmark, Netherlands, Belgium and England.

Parker Opens New Offices

W. J. Parker, organizer and director of trade associations, has announced the opening of larger quarters at 7 E. Forty-fourth St., New York City, with an increased staff.

Jordan Tells Radio Men Overproduction Exists

Automobile production today is 40 per cent ahead of the demand and the radio industry will suffer from the same condition unless precautionary steps are taken, Edward S. Jordan, president of the Jordan Motor Car Co., said in addressing a recent meeting of the dealers' division of the St. Louis Radio Trades Association.

After the supply has passed the demand, Mr. Jordan continued, the law of diminishing returns operates, and "the least business-like dealers pass out of the picture in great numbers."

Corrective sales methods was the remedy suggested by Mr. Jordan, who pointed out the desirability of addressing a special sales appeal to the daughter of the family, who often controls the buying of the family car and radio.

Gutterson's Duties Increased

Wilder Gutterson has been appointed to take charge of the sales of automotive equipment of the American Chain Company, Inc., in the Detroit district. This is in addition to his other duties.

Wait Elected by Indian Cycle

Election of J. Russell Wait, of Charleston, S. C., as president of the Indian Motocycle Co., succeeding Louis E. Bauer, has been announced by Charles A. Levine, member of a group that has recently acquired control of the company.

Perfex Names Tambert

Mr. D. T. MacLeod, president of the Perfex Corp., manufacturer of heavy-duty radiators, has announced the promotion of John W. Tambert, who for nearly five years has been in charge of the cost and manufacturing departments, to the post of secretary and treasurer, taking the place of C. G. Phelps, who recently resigned.

Historic Shack Presented to Ford

The birthplace of the electric light, a one-room wood shack in which Thomas A. Edison carried on his experiments, was presented to Henry Ford by the General Electric Co., in the presence of Mr. Edison, on June 22. The ceremony took place at Parsippany, N. Y.

Fleetwing Appoints Colyer

D. J. Colyer, formerly general manager of the Patriot Truck Manufacturing Co. at Lincoln, Neb., and more recently vice-president of the Arrow Aircraft and Motors Corp., has been appointed vice-president of the Fleetwing Aircraft Co., Inc., with headquarters at Lincoln.

Detroit Gasket Co. Offers Stock Issue

Company Five Years Old Bought Springman Paper Products Co. Last Year

DETROIT, June 25 — The Detroit Gasket & Mfg. Co. is offering 57,500 shares of common stock at $20 a share through William L. Davis & Co., brokers. The company, which manufactures non-metallic gaskets, has outstanding 143,750 shares of common stock as the only capital liability.

The company has reported profits in each of the five years since its incorporation, and, to increase its capacity, acquired the Springman Paper Products Co. of Detroit last year. Net earnings for 1928, after deduction of all charges, including Federal taxes, were $250,294, equal to $1.74 a share on the outstanding common stock issues.

Expansion is reported in the net thus far in 1929 with the balance after all charges, including taxes, for the first five months amounting to $206,873, or $1.43 a share, at an annual rate of $3.43 a share. The board of directors has declared its intention of placing the issue on a $1.20 annual dividend basis. Application will be made to list the shares on the Detroit Stock Exchange.

Libby Owens Directors Recommend Stock Split

DETROIT, June 25—Directors of the Libby Owens Sheet Glass Co. have recommended a change in authorized capital stock on $25 par at no par, and to issue four new shares for each share outstanding. This will involve an increase in authorized capital, the amount of which has not been determined. Stockholders' meeting will be called early in July to take action on this recommendation and also on changing the name of the company to Libby Owens Glass Co.

Directors voted to increase dividend rate on outstanding stock to $4 from $2 annually. The present authorized capital is 1,000,000 shares of which 443,013 are outstanding.

Self-Aligning Bearings Co. Headed by S. F. Goodman

NEW YORK, June 22—The Self-Aligning Bearings Co., Inc., has recently been organized for the manufacture of self-aligning ball bearings. S. Fabian Goodman, for 20 years connected with the ball bearing trade as wholesaler and importer, is president of the new corporation; Edmund Josephs is treasurer, and Harold Zeamans is secretary.

The company has acquired a factory in the Pesl Building, Paynter and Ely Avenues, Long Island City, and has equipped the factory with new machinery. Frank J. Jarosch is chief engineer and brings to this position a long experience in the bearing manufacturing business. He has spent all his business career in that field.

New Durant Building Speeds Parts Shipment

DETROIT, June 24—With the opening of a new parts building comprising 40,000 square feet of floor space, at its factory in Lansing, Durant Motors, Inc., is now in a position to ship parts the same day that orders are received, according to A. K. Steigerwalt, director of service.

The lay-out is so arranged that each day's parts orders from Durant dealers can be assembled, checked, packed and loaded in one continuous movement under one roof—without backtracking, side trips, or any other lost motion. The company's parts system is backed up by a standard forecast of parts demand, on which is based a three months' inventory so that there may be no slip-up in "same day" shipment service.

Color Index Favors Brown

NEW YORK, June 22—The *Automotive Color Index* for June, issued by E. I. duPont de Nemours & Co., shows increasing preference for brown and black, at the expense of blue and green, although blue retains the top position. Black is in the highest index position during the past two years. According to the index for May, 1929, colors, in the order of preference are: blue, brown, gray, black, green, staples, beige.

Indiana Sales Increase

INDIANAPOLIS, IND., June 24—New cars and trucks delivered in the state of Indiana during May showed substantial increases over the registrations for May of last year, according to figures just released by the motor vehicle registration department of the secretary of state's office. The passenger car total of 13,300 for May compares with 14,637 for April and 10,627 for May, 1928, while truck figures were 1242 for May this year, 1498 for April and 876 for May of 1928.

Ford to Exhibit Plane

DETROIT, June 22—A forerunner of attempts by American manufacturers to establish a European market for American-built airplanes was seen in the shipment from Boston last week of a Ford trimotor air transport for exhibition at the International Aircraft Show to be held at the Olympia Gardens in London, July 16 and 17. This is the first of the all-metal Ford planes ever sent to Europe.

C.I.T. Buys Assets

NEW YORK, June 21—Commercial Investment Trust Corp., through its subsidiary in Chicago, has purchased receivables of the Equipment Finance Corp. of that city, aggregating approximately $3,000,000.

Financial Notes

McQuay-Norris Manufacturing Co. directors have declared a cash dividend of 50 cents a share, payable July 1 to stock of record June 22. The board also declared a stock dividend of one per cent, payable July 10 to stock of record June 22. Stockholders of the company have also approved the proposal to issue new stock and shortly after July 1, warrants will be issued for the purchase of the new stock authorized by the stockholders, in the ratio of one share for each ten shares held at the close of business July 1.

Perfect Circle Co. earnings for the first five months of 1929 were $404,562, a gain of nearly 60 per cent over the same period in 1928, according to C. N. Teetor, president and general manager. Earnings, after taxes, for May, 1929, were $102,977, greater than any month in the company's history. Mr. Teetor said that his company had made an all-time production record in May by turning out 5,015,000 piston rings.

Durant Motor Car Co. of California is expected to resume dividend payments in July or August, if business continues at the present rate, according to well-informed circles. Operations of the company resulted in a net total profit of $648,078 for 1928, of which amount 50 per cent went to the parent company.

Firestone Tire & Rubber Co. has declared regular quarterly dividends of $2 payable July 20 to stockholders of record July 10 and $1.50 on six per cent preferred payable July 10 to stockholders of record July 1.

Allied Products Corp. reports net income for the first five months of the current year after all charges of $500,955. This is equivalent to $10.01 a share on Class A stock and $5.64 a share on outstanding common stock.

E. W. Bliss Co. has declared quarterly dividends as follows: Twenty-five cents on common, $1 on first preferred, 87½ cents on second preferred, Class A, and 15 cents on second preferred, Class B, all payable July 1 to stockholders of record June 18.

Marmon Motor Car Co. and subsidiaries report profit for the quarter ended May 31, before Federal taxes, of $1,238,637. This is equivalent, after preferred dividends, to $4.70 a share on common stock.

Aviation Credit Corp., a part of the Keys-Curtiss group of companies recently organized to finance sales of aviation equipment on a time basis, reports earnings for its first two months of operation of $90,005.

Kelsey-Hayes Wheel Corp has declared regular quarterly dividend of $1.75 on preferred payable August 1 to stockholders of record June 22.

Brockway Motor Truck Corp. has declared regularly quarterly dividend of 75 cents payable August 1 to stockholders of record August 15.

Detroit Aircraft Corp. stock was formally listed on the New York Curb market June 20 and trading in the total of 887,000 shares started in the morning.

Packard Electric Co. has declared an increased dividend of 65 cents payable July 15 to stockholders of record June 30.

Hayes Body Corp. has declared a two per cent stock dividend payable July 1 to stockholders of record June 25.

Committee Appointed by Lamont to Study Reduction of Motor Vehicle Accidents

WASHINGTON, June 27—A special committee to study motor vehicle maintenance with a view to reducing the number of accidents from faulty mechanism was appointed last week by Secretary of Commerce Robert P. Lamont. William Candler, Atlanta, Ga., was named chairman of the committee which includes 38 representatives of manufacturers, automobile dealers, motor clubs and operators.

In making known the membership of the committee, Secretary Lamont declared that inspection of 5,057,480 cars in 10 states during 1927 and 1928, revealed that 1,694,758 required brake correction to meet legal requirements, 230,547 had defective lamps, 77,643 had defective steering gear, and 200,000 were below legal requirements.

Chairman Candler stated that the committee will undertake its study under three headings as follows: (a) the facts regarding accidents due to faulty vehicle maintenance; (b) technical requirements for proper maintenance, including such items as brakes, headlights, horns, steering gear, tires, mirrors and windshield wipers; (c) methods for securing proper maintenance. Under the latter heading, Mr. Candler declared, the committee will canvass a wide field of proposed suggestions including periodic inspections, systematic inspection by dealers, service stations, and garages, education of the driving public, and the problem of the junk car.

Members of the committee are:

Holger Jensen, Maryland Casualty Co.; N. H. Boynton, General Electric Co.; Mrs. Louis T. de Valliere, Trenton, N. J.; Frank Jack, Chicago Motor Club; L. L. Miles, Louisville Taxicab & Transfer Co.; Henry J. Mineur, Horton Ice Cream Co.; George A. Parker, registrar motor vehicles, Mass.; L. H. Palmer, Fifth Avenue Coach Co.; Edmond O. Carl, Washington, D. C.; E. C. Crittenden, Bureau of Standards; Edw. A. Donohue, Commissioner of Traffic, Cleveland; R. N. Falge, General Motors Research Laboratory.

R. F. Goebel, Rubber Association of America; Val Haresnape, American Automobile Association; T. A. Horrocks, Minnesota Truck Owners Association; Charles D. Hastings, Hupp Motor Car Corp.; John R. Oishei, Trico Products Corp.; Sidney J. Williams, National Safety Council; R. S. Armstrong, Motor Vehicle Conference Committee; Leon F. Banigan, *Motor World Wholesale;* Col. E. Austin Baughman, Commissioner of Motor Vehicles, Maryland; Charles P. Clark, American Automobile Association; F. W. A. Fitzsimmons, Michigan Mutual Insurance Co.; A. V. Hall, Sherwood Hall Co.

Harter B. Hull, Baltimore; Claude Klugh, Pennsylvania Auto Dealers Association; W. F. Little, Electrical Testing Laboratories; Oscar G. Olander, Department of Public Safety, Lansing, Mich.; P. K. Wadsworth, Great Lakes Stages, Cleveland; A. W. Whitney, National Bureau of Casualty and Surety Underwriters, and Richard J. Wall, Yellow Cab Co., Toledo. Howard M. Starling, manager of the safety department of the American Automobile Association, Washington, is secretary.

Fairchild Aviation Corp. Adopts Five-Day Schedule

NEW YORK, June 24—Fairchild Aviation Corp. placed its factories at Farmingdale, L. I., on a five-day week schedule for all shop workers beginning today. Workers are paid on a piecework and bonus basis and it is anticipated that there will be no change in their earning capacity.

In commenting on this change, Donald S. Michelsen, executive assistant to Sherman M. Fairchild, president, said: "We feel that the quality of our product and the efficiency of the employees will be greatly enhanced through the latter having generous opportunity for the long week-end made available by the five-day week."

Morris Paint Adds Unit

ST. LOUIS, June 22—The Morris Paint & Varnish Co., manufacturer of industrial paint products and automotive specialties, has purchased the Common Sense Mfg. Co., maker of "Common Sense" automobile polish, according to an announcement by L. Sophir, president of the former company. Manufacture of "Common Sense" products will be continued by the Sealrite division of the Morris Paint & Varnish Co., and J. Jay Sophir, president of the company, will be in charge of the division.

Rules for Plane Safety Outlined by Guggenheim

NEW YORK, June 24—Seven general principles applicable for safe conduct of passenger air transport were outlined by Harry F. Guggenheim, president of the Daniel Guggenheim Fund for the Promotion of Aeronautics, in speaking over the radio last Saturday in the National Safety Council's weekly safety program. These principles are:

1—Multi-engine planes capable of flying on the disability of at least one engine. 2—Two pilots licensed by the Federal Government. 3—Planes and engines licensed by the Federal Government. 4—Adequate landing facilities over the route to be flown. 5—Intensive weather reporting service over the route to be flown. 6—Wireless or at least a visual communication system between the plane and the airway. 7—Last, and most important of all, responsibility of the operators in the air service.

British Ford to Produce 50,000 Units This Year

NEW YORK, June 24—Ford Motor Co.'s British subsidiary will produce close to 50,000 cars this year and expects to reach 200,000 in another year, according to Edsel Ford, who returned last week from a six weeks' inspection trip of his foreign interests. The outlook in foreign countries is exceedingly good, in Mr. Ford's opinion, and manufacturing facilities are being rapidly expanded to meet this increasing demand.

Mr. Ford and his family were met at the pier by Henry Ford, and during the taking of photographs a bottle of flashlight powder was exploded near them and several persons were hurt by flying glass. The Ford family, however, escaped injury.

S.A.E. Members Approve Six New Specifications

WASHINGTON, June 27—Twenty-seven reports submitted by 13 divisions of the standards committee of the Society of Automotive Engineers at the annual meeting of the Society have been approved by letter ballot of the members, according to an announcement this week by the Department of Commerce.

These reports include six new specifications, 15 revisions of former standards, and six cancellations of obsolete specifications. Following the revision of specifications for aeronautic propeller hubs and shaft ends, it is proposed to standardize aeronautic thermometer bulbs and the dimensions for aeronautic instrument cases, says the announcement.

Mullins to Build New Plant

SALEM, OHIO, June 22—Plans for a new factory building which will greatly increase production of bodies, radiators and other automobile products, have been announced by the Mullins Mfg. Co. here, work to commence immediately.

The new factory unit, to cost approximately $60,000, will be 104 feet wide by 202 feet in length, of brick, one story high.

Service to be Centralized

NEW YORK, June 22—Chrysler Motors has announced the inauguration of a centralized service depot for all Chrysler products in New York. These will be housed in a new consolidated service building, eight stories high, covering an entire city block between Sixty-fifth and Sixty-sixth Streets, fronting on West End Avenue. The plant will be in operation late in the fall.

The Principals in the Ford-Soviet Agreement

Valery I. Meshlauk (left), vice-chairman of the Soviet Supreme Economic Council, Henry Ford and Saul G. Bron (right), chairman of the board of directors of the Amtorg Trading Corp., principals in the recently signed agreement, by the terms of which the Ford Motor Co. will supply plans and technical data for the construction of an automobile factory at Nizhni Novgorod. Mr. Ford said last week that the factory should make 1000 cars a month within a year of its establishment.

Army Orders 162 Planes; Boeing Gets Large Share

WASHINGTON, June 27—Assistant Secretary of War Davison has approved contracts for the construction of 162 new airplanes for the Army Air Corps, in accordance with the terms of the five-year program, at a cost of $5,000,000.

Ninety of the new planes ordered are P-12B pursuit planes powered with Wasp radial air-cooled engines, to be manufactured by the Boeing Airplane Co.; 41 will be O-1E Curtiss observation planes, and 28 A-3B attack planes, both types having water-cooled engines, and the remaining three will be experimental types to undergo exhaustive tests at Wright Field.

Diesel Tank Engine Tested

PARIS, June 22—Practical tests of a two-cycle Diesel engine in a French Army tank have been completed with satisfactory results by the artillery department of the army. The engine, which is built in France by the Societe Lilloise des Moteurs, a branch of the Peugeot organization, is a two-cylinder vertical double piston two-stroke of 80 by 300 mm. bore and stroke, developing 40 hp. at 1000 r.p.m. and 50 hp. at 1250 r.p.m. It was fitted in the tank in place of the normal Renault gasoline engine.

Twin Coach Sales High

KENT, OHIO, June 22—Net sales of the Twin Coach Co., maker of passenger buses for the year 1928, were in excess of $4,000,000 and are at this time substantially in excess of the corresponding period for last year, according to H. G. Taylor, treasurer. Shipments for May were particularly satisfactory and it is expected that shipments for June and the succeeding months will exceed the May volume.

Tokio Trip Planned

NEW YORK, June 24—Arrangements for the transportation of American engineers and European delegations to the World Engineering Congress at Tokio, Oct. 30, have been announced by Maurice Holland, executive secretary of the American committee. The official S.S. President Jackson and Shmyo Maru, will depart from San Francisco on Oct. 10. The American party, numbering about 250, will leave New York for San Francisco on two special trains. The first, scheduled to depart on Oct. 2, will proceed via Washington.

Equipment Sales Show Slight Drop

M. and E. A. Index Drops 9 Points From April Mark

NEW YORK, June 24—Sales of parts and equipment during May continued relatively high, although they showed some slight recession from figures established earlier this year, according to the Motor and Equipment Association indexes of business conditions in its industry. As has been anticipated for the past month or two, sales of original equipment receded somewhat from the recent record figures, anticipating a recession in new car production. The index for this group for May was 278 as compared with 287 in April, and with 215 in May of last year.

After a four-months' period of exceptionally high sales, service parts sales showed a recession also, recording an index of 169 in May as compared with 174 in April, and with 183 in May of last year. This recession seems to be a seasonal tendency, although this year it anticipates by a month the seasonal trend of the past two years. April was the highest month this year, being higher than April of either 1927 or 1928. The recession in the two earlier years took place in June with May being the highest month.

The accessory index is unchanged for May, being 91 as it was in April and compares with 113 in May of last year. Service equipment continues active although here, too, the seasonal recession has set in. The index for this group is 200 as compared with 227 in April and with 157 in May of last year. The grand index for the whole group was 245 as compared with 254 in April and with 201 a year ago. Member wholesalers' business continues to advance, their index for May being 142 taken on a basis of January 1928 as 100 and compared with 140 in April. Accounts receivable on the books of wholesalers also showed a slight advance of three per cent over the previous month.

Studebaker Lists More Stock

NEW YORK, June 22—Listing of 78,900 additional shares of Studebaker Corp. no par common stock on the New York Stock Exchange has been approved. This additional listing is to cover additional stock to be issued in connection with the exchange for Pierce-Arrow Class A stock as approved by stockholders of Pierce-Arrow this week.

Linde Opens Oxygen Plant

NEW YORK, June 22—Linde Air Products Co. has announced the recent establishment of an oxygen producing plant in Louisville, Ky.

Fiat Making Engine for Schneider Race

PARIS, June 22—Col. Umberto Savoia, a pioneer aviator and well-known Italian aviation expert, has been appointed chief of the Commercial Technical Section of the Fiat Co. In addition to seeking to develop commercial transport lines, his duties will involve the coordination of the four aviation departments, namely, engine design, airplane design, engine construction, and airplane construction.

Complete mystery surrounds the construction of the Italian motors for the Schneider Cup race at Venice next September. The Government has instructed both Fiat and Isotta-Fraschini with the construction of engines for this speed test and has imposed absolute secrecy. The buildings are guarded, and no persons outside the particular department are allowed to enter. Fiat engineers admit that special engines are being built and that they are making an unusual effort to capture the speed trophy, but they refuse to give any precise information. When completed, the Fiat and Isotta-Fraschini engines will be turned over to the Government, which will decide on the models to be used in the race. In addition to producing engines, the airplane section of the Fiat company is building planes to the designs of Engineer Rosatelli.

Mathis Building New Plant

PARIS, June 20—Supplementing the main factory at Strasbourg, Mathis, S.A., Automobiles, is building an assembly plant with an area of 861,000 sq. ft., at Gennevilliers, in the suburbs of Paris, a short distance from the French Ford factory. At the present time the area covered is 215,000 sq. ft. This factory will receive units from Strasbourg, which will be brought directly into the buildings by rail. The Paris assembly plant, which includes a service station, will supply the Paris region and the west of France. Mathis reports that production has increased 100 per cent in two years. Two models are being produced: an 8 hp. four-cylinder and a light six.

Shanghai Dealers Form Trade Group

WASHINGTON, June 27—Shanghai motor car importers and distributors have succeeded in effecting an organization to be known as the Allied Automotive Association of China, says a Shanghai report received this week by the Department of Commerce. Importers and distributors representing about 90 per cent of the motor car dealers in Shanghai have agreed to the formation of the association, it was stated.

N. J. Registers 11,485

NEW YORK, June 24—New car registrations in New Jersey, during May totaled 11,485 as compared with 11,757 in May of last year, according to Sherlock & Arnold. Total new registrations for the first five months were 53,262 as compared with 47,663 for the corresponding period of last year.

Franklin Developing Engine

SYRACUSE, N. Y., June 22—An air-cooled airplane engine is being developed in the experimental laboratories of the H. H. Franklin Mfg. Co., according to an announcement by H. H. Franklin, president of the company.

Laboratories Set Up for Motor Fuel Study

NEW YORK, June 24—Ethyl Gasoline Corp., owned jointly by General Motors Corp. and the Standard Oil Co. of New Jersey, has established a nation-wide network of laboratories for the study of motor fuels. The system embraces a chemical laboratory at Yonkers, N. Y., devoted to fundamental scientific research in motor fuels, a technical laboratory in Detroit to aid automobile manufacturers in solving problems of construction and a group of knock-testing laboratories located at various geographical centers.

The laboratory system is headed by Dr. Graham Edgar, former head of the department of chemistry in the University of Virginia. Special work will be carried on to test gasolines derived from various crudes, some of which are known to produce definite anti-knock fuels and others which have a distinctly opposite effect.

Crude Rubber Quiet

NEW YORK, June 24—Crude rubber trading continues fairly quiet with price fluctuations covering a narrow range, according to F. R. Henderson Corp. Preliminary report of increases in tire inventories as of May 31 served somewhat to depress the market but this company believes that the statistical situation is clearing itself and a firmer position is to be expected soon.

Arrivals of crude rubber at all ports of the United States from June 1 to 21 are estimated at 25,700 tons, with the entire months' imports estimated at between 41,000 and 42,000 tons. World stock at the end of May is estimated at 236,300 tons, including rubber in the hands of consumers, in transit, and at shipping ports but not stocks on estates. London stocks were decreased last week to 31,142 tons.

Calendar of Coming Events

SHOWS

International Aircraft Exhibition, Olympia, London ..... July 16-27
International Aircraft Exhibit, Coliseum, Chicago ..... Sept. 7-15
National Machine Tool Builders' Exposition and Congress, Cleveland, Sept. 30-Oct. 4
Paris, Automobiles ..... Oct. 3-13
London, Automobiles ..... Oct. 17-26
Prague, Automobiles ..... Oct. 23-30
Paris, Motorcycles ..... Oct. 23-Nov. 3
M.&A.E. Show and Convention, Chicago ..... Nov. 4-9
N.S.P.A. Show and Convention, Detroit ..... Nov. 11-16
Berlin Auto Salon ..... Nov. 14
London, Trucks ..... Nov. 7-16
Paris, Trucks ..... Nov. 14-24
London, Motorcycles ..... Nov. 30-Dec. 7
Brussels Auto Salon ..... Dec. 7
New York National ..... Jan. 4-11
Chicago National, Coliseum..Jan. 25-Feb. 1

CONVENTIONS

Motor Bus Division, A.A.A., Third Annual Meeting, Buffalo ..... July 1-2
American Automobile Association, Buffalo ..... July 1-2
International Chamber of Commerce, Fifth Congress, Amsterdam...July 8-13
National Association of Show and Association Managers, Meeting, Chicago ..... July 25-26
Second Pan-American Congress of Highways, Rio de Janeiro..... Aug. 16-31
American Welding Society, Fall Meeting and Exposition, Cleveland....Sept. 9-12
American Institute of Mining and Metallurgical Engineers, Cleveland, Sept. 9-12
American Society for Steel Treating, Convention and Exposition, Cleveland ..... Sept. 9-13
American Chemical Society, Fall Meeting, Minneapolis ..... Sept. 9-13
A.S.M.E.—Iron and Steel Division—National Meeting, Cleveland...Sept. 11-13
Society for Electrical Development, New York City ..... Sept. 13
Eastern States Exposition, Springfield, Mass. ..... Sept. 15-21
American Electric Railway Association, Atlantic City ..... Sept. 28-Oct. 4
National Safety Congress, Annual, Chicago ..... Sept. 30-Oct. 4
Penna. Automotive Association, Erie, Pa. ..... Oct. 7-8
Permanent International Association of Road Congresses, Sixth Session, Washington, D. C. ..... Oct. 7-11
Society of Industrial Engineers, Detroit ..... Oct. 16-18
National Hardware Association, Atlantic City ..... Oct. 21-24
World Engineering Congress, Tokio, Japan ..... Oct. 29-Nov. 22
National Automobile Dealers Association, New York City ..... Jan. 6
National Automotive Dealers Association, Chicago ..... Jan. 27-28

RACES

French Grand Prix ..... June 30
Spanish Grand Prix ..... July 31
British Tourist Trophy Race..... Aug. 17
Akron ..... Aug. 18
National Air Races and Show, Cleveland, Aug. 24-Sept. 2
European Grand Prix, Italy..... Sept. 8
Syracuse ..... Aug. 31
Altoona, Pa. ..... Sept. 2
Cleveland ..... Sept. 1[illegible]

S. A. E.

Aeronautic Meeting, Cleveland..Aug. 26-28
Production Meeting, Cleveland.....Oct. 2-4
Annual Meeting, Detroit..... Jan. 21-24

SALONS

Hotel Drake, Chicago ..... Nov. 9-16
Hotel Commodore, New York City..Dec. 1-7
Hotel Biltmore, Los Angeles..... Feb. 8-15
Palace Hotel, San Francisco, Feb. 22-Mar. 1

new

STEWART-WARNER

mechanically driven

Fuel Pump

Reduces Priming Time 50%

IT IS only natural that Stewart-Warner with their surpassing fuel feed experience and facilities should develop this cam shaft driven gasoline pump with so many outstanding advantages:

Of first importance among these is the large size and form of the upper plate which engages the diaphragm, providing an effective priming feature, reducing priming time by 50% or more.

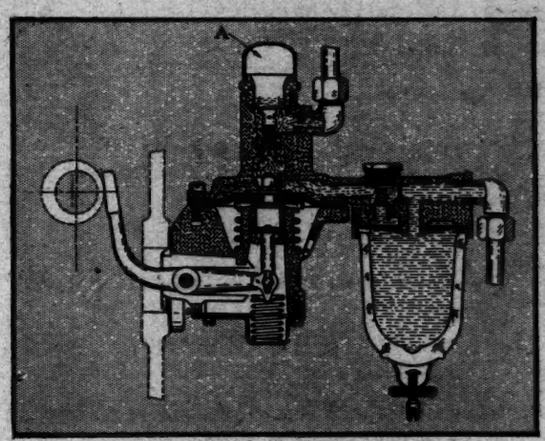
A further advantage of this design is its ability to deliver fuel at highest underhood temperatures and will supply an excess of fuel above any sudden carburetor demand.

The vapor dome ("A" as shown in cross section) aids greatly in maintaining a high and uniform discharge, as well as uniform discharge pressures over a considerable range of speeds.

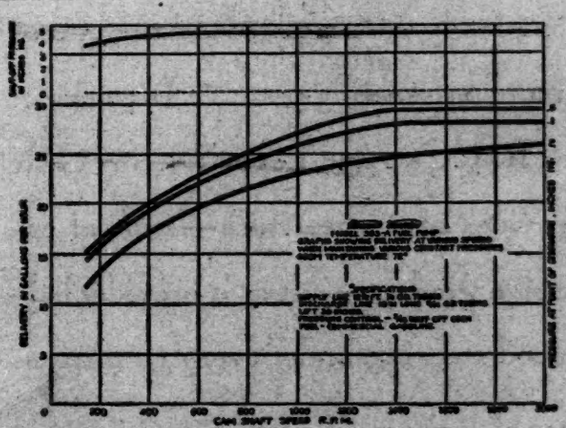
The graph shows quantity discharge over a range of cam shaft speeds from 200 to 2000 R. P. M.

Complete information on the Stewart-Warner Mechanically Driven Fuel Pump gladly sent on request.

Other Stewart-Warner developments in modern fuel feed engineering: In addition to this cam shaft driven fuel feed system, Stewart-Warner's further developments include: An electrically driven unit assembly combining pump, carburetor and filter; A Tank-Installed Electric Pump system; A Tank-Installed Electric Pump for use with carburetors other than Stewart-Warner; A mechanically driven Combination Vacuum Pump and Vacuum Tank System; and the Direct Fuel Feed System, doing away with both pump and carburetor.



Cross-section, Stewart-Warner Mechanically Driven Fuel Pump



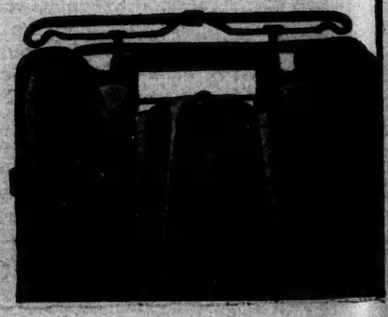
Graphs showing delivery at various speeds while maintaining various constant pressures

STEWART-WARNER CORPORATION . . Diversey Parkway . . *Chicago*

ROSS
Cam & Lever
STEERING

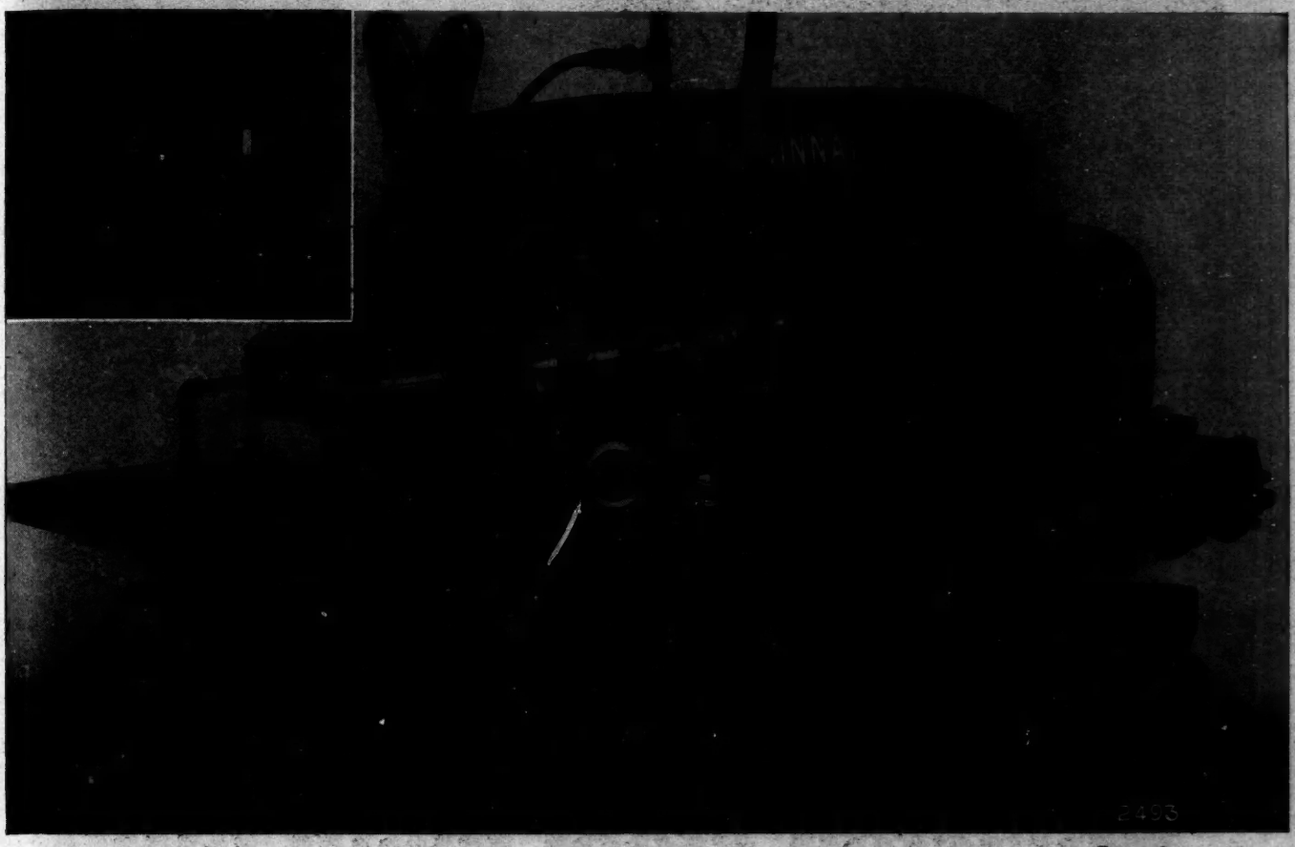
How does it park?

EASE of parking is not the only test of steering. But it is important to every car manufacturer, for at no other time is the driver's attention so completely concentrated on the operation of his steering gear . . . In parking, the Ross Cam and Lever Steering Gear provides *easy* wheel turn—*without* excessive windup—just as it provides balanced steering under every condition.



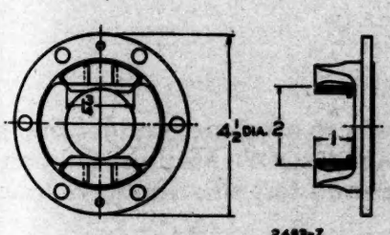
ROSS GEAR AND TOOL COMPANY
Lafayette, Indiana

THE CINCINNATI MILLING MACHINE COMPANY, CINCINNATI, OHIO



Patented

JUST LOAD AND UNLOAD



2493-Z

- Name of Part—Flange yoke.
- Operation—Mill between forks.
- Material—Steel Forging.
- Stock Removed—⅛".
- Cutters—Six 5¾" diameter x 1" wide half side mills.
- Cutter R. P. M.—37.
- Feed—Variable 2" to 8".
- Time per Piece—.117 min.
- Production per Hour—450 pieces.
- Machine—4-36 Plain Cincinnati Hydromatic.

That's all the operator does when running the Hydromatic that is performing a rough milling operation between forks of a flanged yoke. One large fixture with air operated clamps holds three yokes and is mounted on each end of the table. Pieces are placed in the fixture—a simple twist of the air valve lever and the clamps are in position. At the completion of the cut, the clamps automatically release the pieces.

Exclusive features of this machine combined with correct tooling makes this a very profitable installation. For example the machine has a two-way or reciprocating feed cycle that is automatically controlled. This enables the operator to load and unload the work while that in the other fixture is being milled. A table stop lever and plunger are provided for automatically stopping the table during the regular cycle at the completion of each cut. This is an added safety feature for the operator. The operator throws one of the table stop levers into the running position to continue the cycle of operation. Positive stop and delayed trip in both directions enable the cutters to feed to a definite depth and dwell to clean up the cut—then allow the table to automatically return without attention. The variable feed attachment and cam shown in the insert, by which the feed is automatically varied from 2" to 8", is of very great importance.

On this job production was increased 100%, cutter life increased 200%, labor costs were lowered and handling time considerably decreased. These are real performance facts. Are you getting them?

Dependable Counsel on Milling

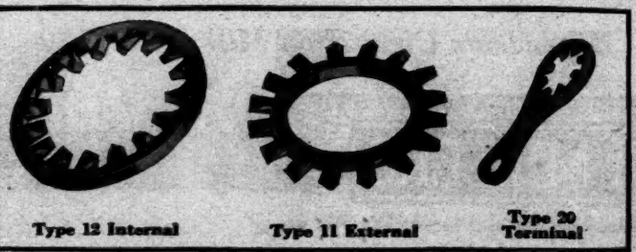
CINCINNATI MILLERS

Twisted steel teeth biting into the nut...

SHAKEPROOF LOCK WASHERS are designed to hold nuts securely regardless of strain or vibration. Around the circumference of the washer are teeth of hardened steel, twisted. When a nut is turned down, each tooth bites in with a grip of steel. Only applied force can loosen their tenacious hold.

This unique design of SHAKEPROOF Lock Washers also prevents linking and speeds up production.

Over 150 different types of industries are finding new savings in SHAKEPROOF Lock Washers. Somewhere on your product there is a place for SHAKEPROOF. Mail the coupon below for samples and test this modern lock washer out.



Type 12 Internal — Type 11 External — Type 20 Terminal

SHAKEPROOF
Lock Washer Company
[Division of Illinois Tool Works]
2503 North Keeler Avenue — Chicago, Illinois

U.S. PATENTS 1,419,304; 1,604,122; 1,697,904. OTHER PATENTS PENDING. FOREIGN PATENTS

FREE SHOP TEST SAMPLES

SHAKEPROOF LOCK WASHER CO.
2503 North Keeler Ave., Chicago, Ill.

Please send me samples of

☐ Shakeproof Lock Washers to fit bolt size_____

☐ Shakeproof Locking Terminals, size_____

Firm Name_____

Address_____

Town_____ State_____

By_____

Working HAND IN HAND WITH THE Engineers

WHEN four-wheel brakes created new steering problems, automotive engineers found Gemmer ready with a gear that took care of the troubles. Balloon tires had previously set up new standards of steering ease and engineers found Gemmer engineers had anticipated steering difficulties and had designed a gear to eliminate them.

It was then only natural that the makers of the first front-wheel drive cars should look to Gemmer to solve their steering problems. Hand in hand with the designers and engineers, Gemmer developed a steering gear capable of easily and effortlessly controlling the heavy front end pressures exerted by front-wheel drives—and today the only front-wheel drive passenger cars on the market are equipped with steering by Gemmer.

GEMMER MANUFACTURING COMPANY
DETROIT, MICHIGAN

GEMMER

"SMOOTHER STEERED WHEN GEMMER GEARED"

The close-up is a Davis & Thompson Rotomatic machine with connecting rods and caps in position for drilling, while in the background is one for drilling universal joints.

Meet Modern Methods Without Waste

SPINDLES in the machines made by the Davis & Thompson Company, of Milwaukee, are mounted on New Departure Ball Bearings because their engineers have found these bearings superior for conserving machine life and minimizing lubricant and upkeep expense. Then again, the heavy thrust from the drill is easily absorbed by these bearings with least possible loss of power. New Departures eliminate the evils of waste from the necessary haste of modern industries—they insure rigidity—accuracy—and permanency wherever used.

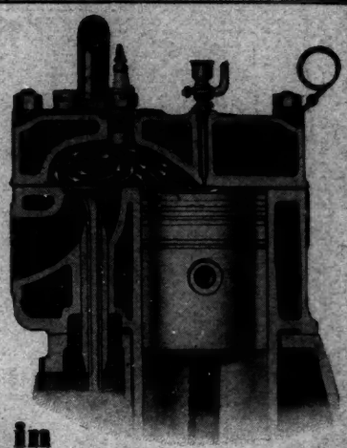
The New Departure Manufacturing Company, Bristol, Connecticut; Detroit, Chicago, San Francisco and London.

NEW DEPARTURE

BALL BEARINGS

NOTHING ROLLS LIKE A BALL

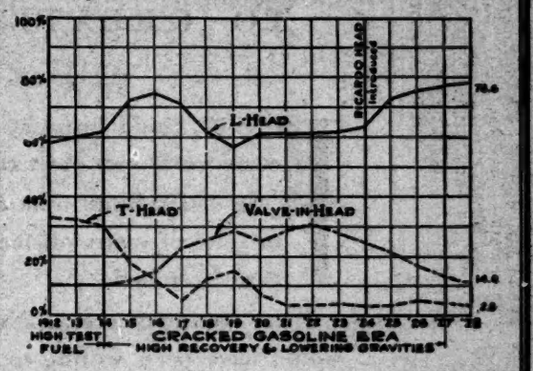
1290



Cross-sectional view of a *Ricardo Head* engine indicating how complete combustion is promoted by turbulence, as shown by arrows.

Trend in Valve Location

Data from Automotive Industries Statistical Number



The L-Head Engine has always had the call

A glance at the chart will show that *not even during the war* did the overhead valve seriously challenge the L-Head. In 1924 the *Ricardo Head* principle was introduced. Its advantages were promptly recognized and in its basic principle it was widely adopted. Because of its great simplicity the L-Head engine has rapidly increased in popularity ever since—while the use of the overhead valve engine has shown a correspondingly marked decrease.

Waukesha L-Head Engines, with *Genuine Ricardo* combustion chambers, combine high power, reliability, efficiency, long-life and *simplicity*. Write for descriptive bulletin. *Automotive Equipment Division, Waukesha Motor Company, Waukesha, Wisconsin. Offices: New York and San Francisco.*

947

△ △ △ **WAUKESHA ENGINES** △ △ △

HERE

ACHIEVEMENT IS ONLY A STEPPING STONE TO GREATER TRIUMPHS

In 1912, Budd brought forth a revolutionary type of coachwork—an open car body made entirely of steel.

In 1919, Budd took another long step forward and, in spite of many obstacles, produced the first all steel, closed car body.

Many manufacturers, with such victories to their credit, would have been willing to rest upon their laurels. Not so with Budd. Those early triumphs were only a spur to greater efforts. Budd kept on thinking, kept on working.

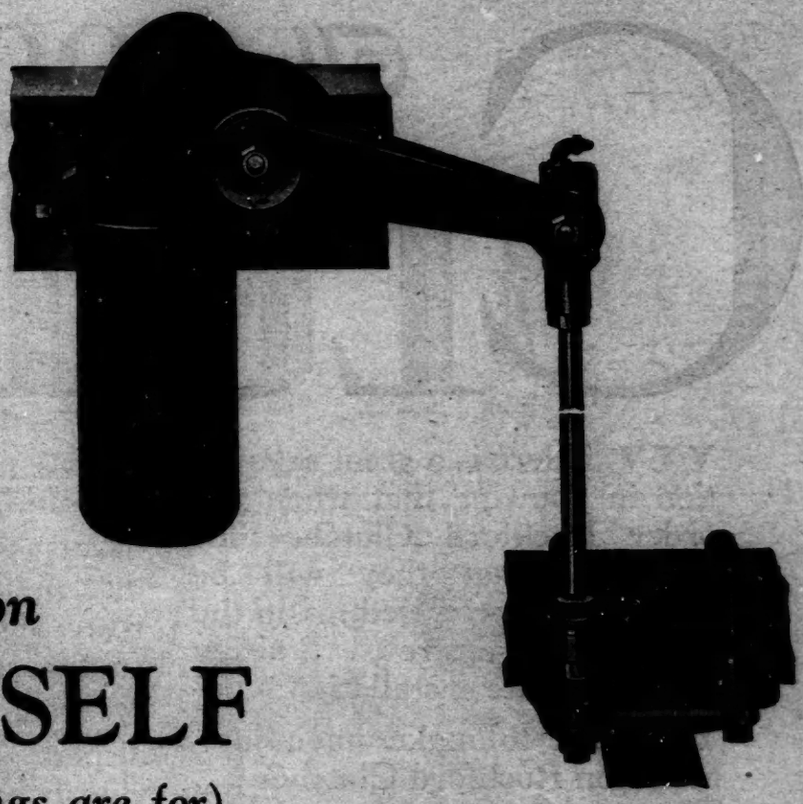
And so, in 1926, came Budd's third and greatest contribution to the coachbuilder's art — the one-piece, all steel automobile body. A body that, from front to rear and back again, is one smooth, unending piece of steel. New beauty. new safety, made possible.

What Budd's next achievement will be, no one—not even Budd—can tell you. Suffice it that the Budd idea—that each victory must be but a stepping stone to a greater triumph—is still the guiding star of this organization. And certainly today, with 17 years of experience to build upon, with plants in both Europe and America, and with facilities for the production of *any* type of automobile body, Budd is better equipped than ever before to do the unusual in body-building.

The E. G. Budd Manufacturing Company, Philadelphia and Detroit. Affiliated with: The Pressed Steel Company of Great Britain; and Ambi-Budd Presswerke of Germany.

BUDD BODIES

BUDD IS THE ONLY BODY-BUILDER IN THE WORLD EQUIPPED TO BUILD ANY TYPE OF BODY



Let
Spring Compression
STOP ITSELF
(that's what the springs are for)

Real riding comfort comes from letting the car springs absorb the shocks.

The ideal spring suspension is resilient enough to absorb the slightest shocks, yet has the strength and range of movement to absorb maximum shocks.

To absorb the "slightest shocks" a spring must be super-flexible and absolutely free from "preloading" or restriction to its natural flattening under compression.

When a spring flattens under the impact of a violent road shock, means must be provided to take care of the energy stored in the spring. In other words, RECOIL must be controlled—or the passengers will be pitched off the seat.

This is why the Landis Shock Diffuser principle is so successful. The Landis lets the car-springs flatten as they will, stepping in at the instant of recoil, to return the springs to normal without jolt, jar or throw.

To make a real test of Landis Shock Diffusers, put them on a car with super-flexible springs and high-pressure tires. Next, install soft curled hair seat cushions without springs. Then you will have but ONE type of spring—the car springs—between you and the road, and they will be under control of the RECOIL only. Such a test will prove an eye-opener. We urge you to make it.

Landis Engineering & Mfg. Co., Inc.
Automotive Division
Waynesboro, Penna.

LANDIS
Shock Diffuser

LANDIS
SHOCK DIFFUSER

The ROCKFORD CLUTCH

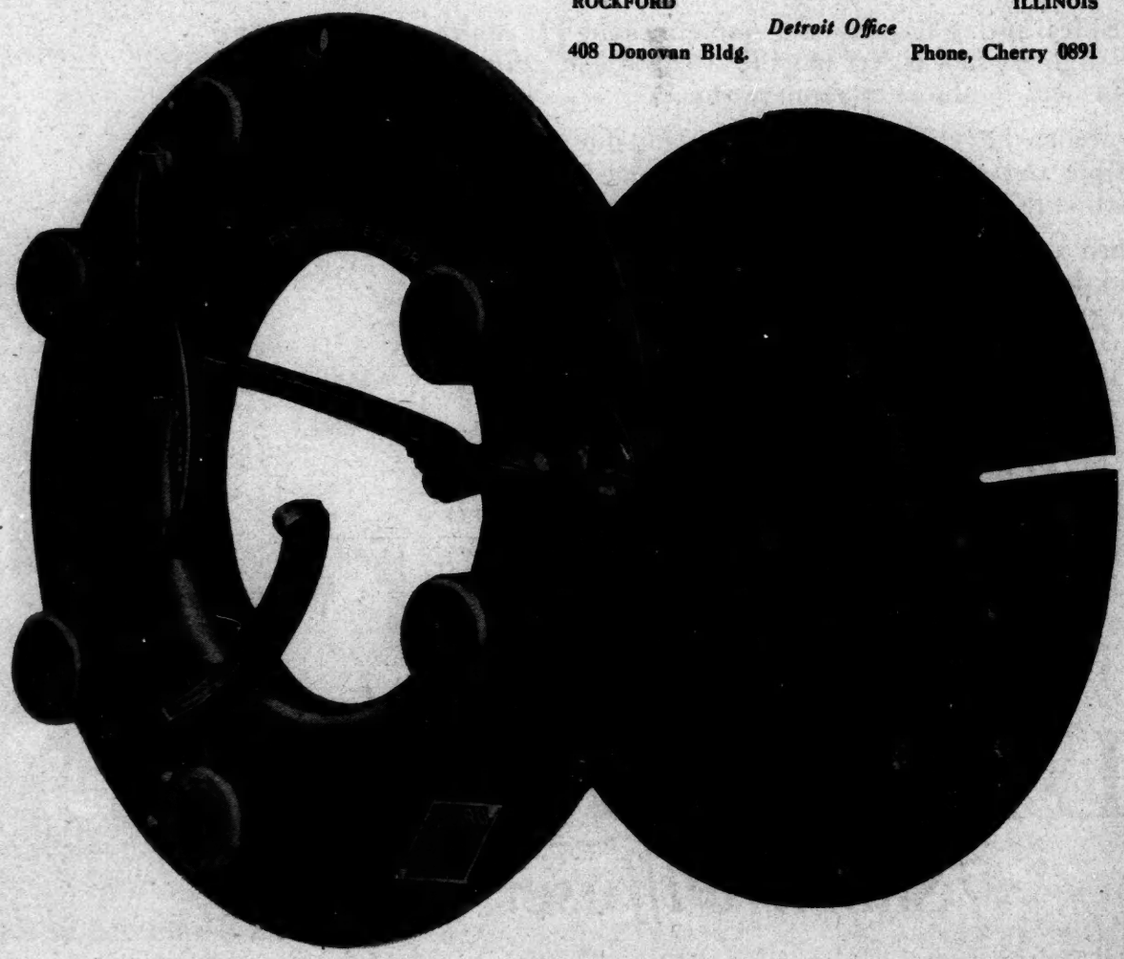
▼▼▼ There is a great satisfaction in knowing that when you order Rockford Clutches for your use that they will be delivered as promised . . . in the quantity you desire . . . . ready for immediate installation.

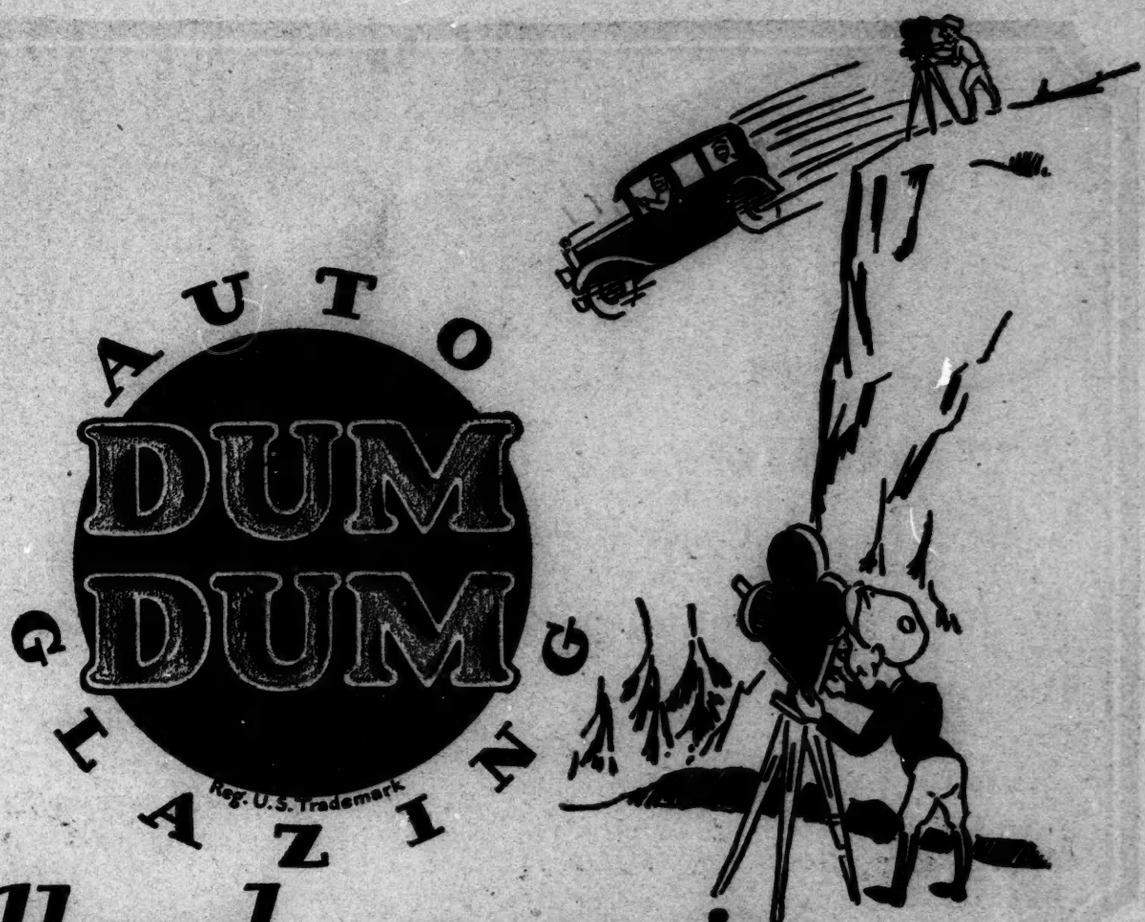
You need to make no adjustments on Rockford Clutches . . . The car owner needs to make no adjustments after the installation has been made. The smooth velvety performance . . . the ease of shifting . . . the prolonged service life . . . are among the features that make Rockford the clutch with superior production advantages.

A tryout in your plant will display clutch advantages previously believed impossible. May we arrange a demonstration?

THE ROCKFORD DRILLING MACHINE CO.
ROCKFORD ILLINOIS

Detroit Office
408 Donovan Bldg. Phone, Cherry 0891





Absorbs every jar

It's really amazing, the way Dum Dum Auto Glazing cures rattling windows. But it's simple, when you know how it works. Once applied, it forms an outer surface as tough as leather . . . yet below this outer surface it stays flexible, to absorb every jar and keep windows tight . . . *permanently*.

Dum Dum is thoroughly dependable. You can rely on its never drying out, cracking or crumbling . . . and on its giving perfect protection in all kinds of weather.

When may we send a man from our technical department to conduct complete and convincing tests for you? We stand ready to serve you, at any time.

THE ARCO COMPANY, CLEVELAND, OHIO
***In Canada:* The Arco Company, Ltd., Toronto, Ont.**

***Branches:*—New York—Chicago—Detroit—San Francisco—Kansas City—Minneapolis—Atlanta—Dallas—Winnipeg, Canada—Edmonton, Canada—London, England—Paris, France—Mexico City, Mexico—Havana, Cuba** (251)

ARCO

PAINTS VARNISHES ENAMELS LACQUERS PRIMERS SURFACERS
MOTOR ENAMELS CHASSIS FINISHES FENDER ENAMELS

This is a
One Operation Job with Marquette Die Cushions

According to the Whiteway Stamping Company, big Cleveland jobbing shop where this stamping is now being made, a certain heater manufacturer brought it to them saying it was impossible to draw this shell satisfactorily on their own presses—which were equipped with springs.

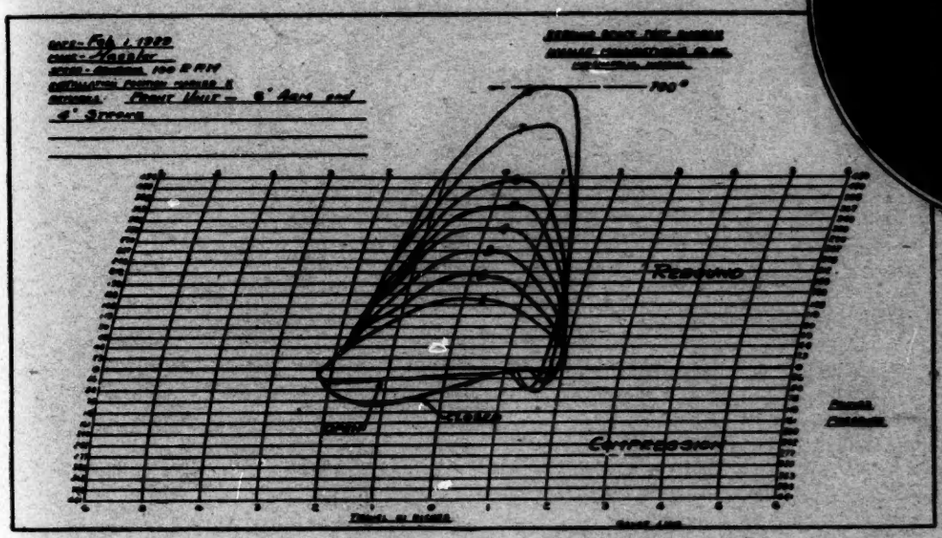
But the Whiteway Company makes a *business* of producing stampings, so all their presses are equipped with Marquette Die Cushions and they were able to handle the job easily.

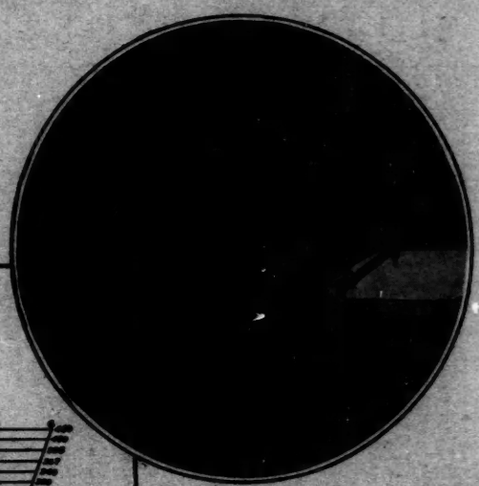
Today they are drawing this deep, odd-shaped part (dimensions) from ordinary 22 gauge ternplate on a No. 7 Bliss inclinable press at the rate of 1000 per hour—all strong, smooth shells, no cracks, no wrinkles.

There is a Marquette Cushion for *your* press and *your* job, waiting to pay you a profit. Write, and we will tell you about it.

Marquette
TOOL & MFG. CO.
1912 N. KILBOURN AVE. CHICAGO, ILLINOIS

This scientific, visual proof of the New HASSLER HYDRAULIC'S remarkably smooth two-way control





With this machine the Hassler Two-Way Hydraulic writes its own story.

This graph charts the smooth, even spring control of a Hassler Two-Way Hydraulic with a six-inch arm and a four-inch stroke, a typical front unit. Rebound is indicated at the eight Hassler points of adjustment—compression for open and closed positions only.

—of special interest to manufacturers and engineers in working out settings for their own particular make of car.

Perfected after three years' research and experiment, the New Hassler Two-Way Hydraulic's scientific advance is graphically charted from the action of the shock absorber itself.

Here is the machine that lets the Hassler write its own story of efficiency. Here is a typical graph of this shock absorber's smooth and powerful control.

Note that the graph records eight positions of rebound control. Compression here is shown only in the open and closed positions; there are four others.

In this chart, the record of a typical Hassler front unit, the normal position of the springs with the car at rest is indicated by the extreme right of the graph itself. The travel of the arm is in inches. The absorber control is recorded in pounds, measured at the end of the lever arm.

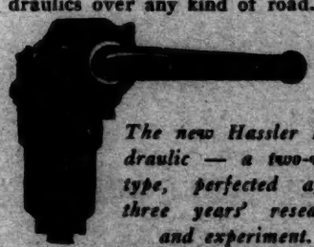
In making this graph, the charting machine was run at 100 R.P.M. Since velocity has much to do with any Hydraulic shock absorber control, 100 R.P.M. is simply a good indication point.

The tests for the entire eight adjustments indicate two things of importance to every engineer and car manufacturer.

First, that as the length of the Hassler Two-Way Hydraulic's compression increases, the compression *control* increases accordingly.

Second, that there is a real amount of rebound control, where you want it, and adjustable. Then an *easing off* to avoid harsh grabbing action.

Those two reasons explain the smooth riding with Hassler Two-Way Hydraulics over any kind of road. They explain why both boulevard bounce and country road jolt are transformed alike into easy, smooth riding.



The new Hassler Hydraulic — a two-way type, perfected after three years' research and experiment.

The New Hassler Two-Way Hydraulics, designed especially for the make of car to which they are to be applied, are delivered from our factory ready to be put on.

Car manufacturers' engineers can work out any ratio of control desired for particular models. While car owners can make any further readjustments to suit their fancy—simply by setting compression and rebound controls located conveniently *outside* the housing.

If you are interested in experimenting with the New Hassler Two-Way Hydraulics, we shall be glad to provide you with sets and co-operate in your work.

Telephone or write our Indianapolis headquarters or our Detroit offices.

HASSLER MFG. CO., INC.
Indianapolis, Indiana, U. S. A.

JAEGER

8 DAY WATCHES FOR AUTOMOBILES

QUALITY COMMANDS ATTENTION

What Cartier is to fine jewelry, Jaeger is to fine automobile timepieces. Regular equipment on Cadillac, Fleetwood, Franklin, LaSalle, Packard, Fiat, Hispano-Suiza, Isotta-Fraschini, Lancia, Minerva, Renault, and others. Sold by Jaeger service stations or direct.

JAEGER WATCH COMPANY
INC.
E. L. VAIL, VICE-PRES.

36 WEST FORTY-SEVENTH STREET, NEW YORK CITY

LONDON GENEVA SWITZERLAND PARIS

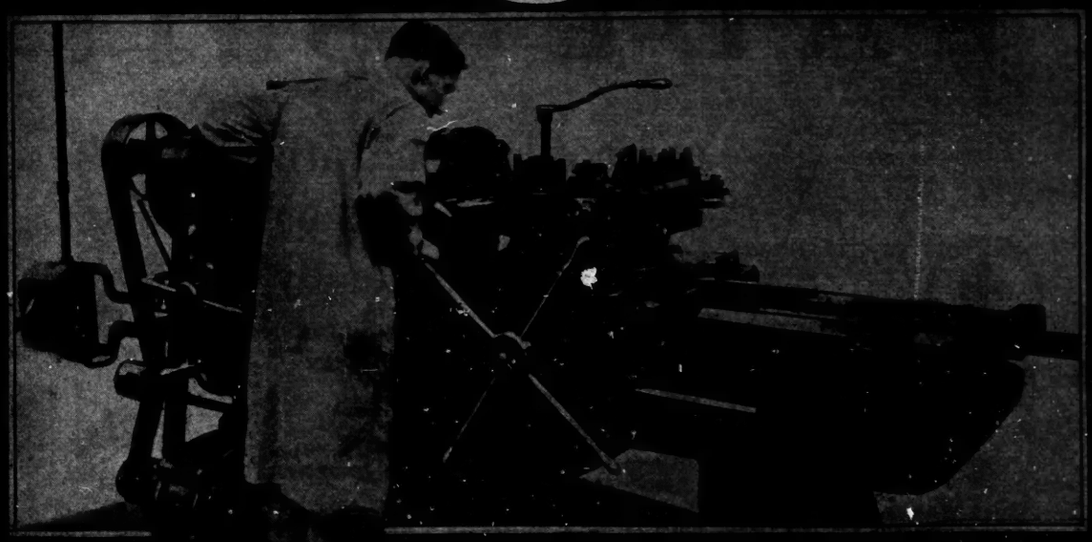
NO TIME LOST

for changing speed on the J&L.

MULTIPLE DISC CLUTCHES

do the job

J&L



LEADERSHIP

can not be arbitrarily adopted. It first must be earned . . . then continually proved.

LE BLOND

LATHES · MILLING MACHINES
CUTTER GRINDERS

LEBLOND

BUILDERS OF "MASTER TOOLS OF INDUSTRY"

MADISON AND EDWARDS ROADS, CINCINNATI, OHIO

Swing Sales Your Way

Style . . . color . . . interior appointments . . . sales arguments catering to a new art consciousness, undoubtedly play an important part in every car sale made today.

But *stability* . . . *safety* . . . *endurance* . . . mean more to the car buyer than they ever did before . . . for car speeds are higher than ever before . . . car strength is tested as *never* before.

And cars that stay young are Timken Bearing Equipped.

There's a world of selling potency in that statement . . . it may easily prove to be the dividing line between a sale made and a sale lost.

Twenty-eight years of impressive national advertising have won universal public acceptance for Timken Bearings . . . and to many thousands of prospective car buyers, "Timken Bearing Equipped" is a deciding factor in judging car worth.

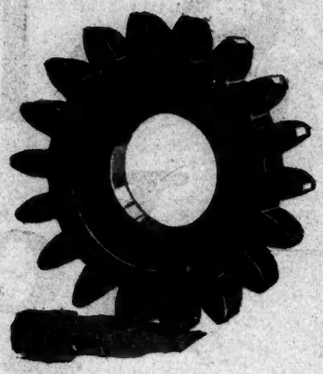
Swing sales your way by taking full advantage of it.

THE TIMKEN ROLLER BEARING CO.
C A N T O N , O H I O

TIMKEN
Tapered
ROLLER BEARINGS

When Trouble Comes

in your Gear Cutting Department



you will appreciate The advantage of ONE Responsibility for results

When gears are not passing inspection, it is frequently a problem to find out just where the trouble lies; whether in the machine-tool or in the cutter. Even after the trouble has been found, there is the problem of correcting it.

Users of Fellows Gear Cutting equipment are free from these delays. We assume full responsibility for both Gear Shaper and the Cutter. Using Gear Shapers equipped with genuine Fellows Cutters, and checking with the Fellows Red Liner, gears come through with clock-like regularity.

Users of Fellows equipment know that we stand squarely back of them, not only solving their problems as they arise, but keeping them solved. There is no gear cutting problem with which we are unfamiliar.

Let us have your request for a copy of our interesting book: "The Practical Art of Generating." No salesman will call upon you unless you want one.

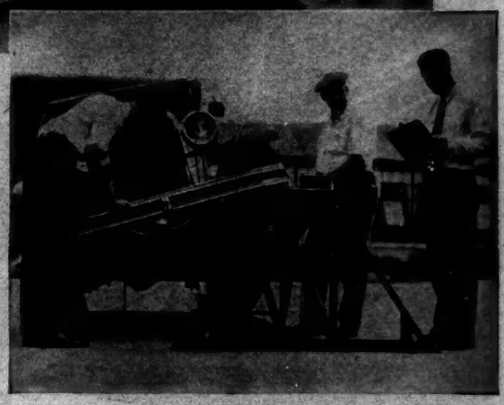
THE FELLOWS GEAR SHAPER COMPANY

Head Office and Works: 78 River Street, Springfield, Vt., U. S. A.

Branch Office: 1149 Book Building, Detroit, Mich.

No. 4 *Inside Pictures of the General Motors Proving Ground*

Engineers examining a photographic accelerometer. This device they developed to show on a motion picture film exactly how much "pick-up" a car has per second.



Twisting a car out of shape to determine how stresses and strains affect all parts of it.

"Prove it!"

"YOU'VE got to show us!" say the engineers at General Motors Proving Ground. They hold no brief for *any* car. Their loyalty is only to *facts*.

The Proving Ground occupies 1268 acres in Michigan convenient to all General Motors' car divisions. It is a great "outdoor laboratory" where automobiles can be tested in a scientific manner under conditions exactly comparable. Especially constructed roads and hills duplicate every driving condition.

At the Proving Ground the General Motors' car divisions thoroughly test and prove their new models before they are offered to the public.

Here also cars of different American and European makes are tested after they are put on the market, thereby enabling General Motors to know precisely how its products compare with others in their respective price classes.

The tests involve speed, power, endurance, braking; riding comfort; handling ease; fuel and oil consumption; body strength—every phase of car construction and performance. Claims and opinions are reduced to *facts*.

* * *

A MOTION PICTURE showing the Proving Ground in actual operation is available in lengths of one, two, or four reels, free of all charges except those of transportation. It may be borrowed by schools, clubs, churches, and other organizations. Please specify whether the 35 or 16mm width is desired and give several weeks' notice in advance of showings. Write to Institutional Advertising Department, General Motors, Detroit.

CHEVROLET · PONTIAC · OLDSMOBILE · MARQUETTE · OAKLAND
VIKING · BUICK · LaSALLE · CADILLAC · *All with Body by Fisher*

GENERAL MOTORS TRUCKS · YELLOW CABS *and* COACHES · FRIGIDAIRE—*The Automatic Refrigerator*
DELCO-LIGHT *Electric Power and Light Plants* · *Water Systems* · GMAC *Plan of Credit Purchase*

TUNE IN — General Motors Family Radio Party. Every Monday Evening, 8:30 Eastern Standard Time. WEAF and 37 other stations associated with N. B. C.

Four large plants—unexcelled production facilities.

Tubular and cellular type radiators *for* Passenger Cars, Trucks and Tractors.

McCord Radiator & Mfg. Co.
Detroit, Michigan

McCORD RADIATORS

A Pratt & Whitney powered plane manufactured by the Boeing Airplane Company and used by the Boeing Air Transport Company in carrying passengers and U. S. Mail between Chicago and San Francisco. In both the plane and the motor Agathon Alloy Steels were used in vital parts.

Agathon Alloy Steels
for greater safety in aviation

IN the building of planes, Agathon Alloy Steels have played an important part. Their makers are the largest suppliers of air craft engine alloy steels in America.

Designers, always seeking better and more durable materials have specified these famous steels, aware of their great strength and endurance. *Every plane that has successfully crossed the ocean from America has had Agathon steel in its motors.*

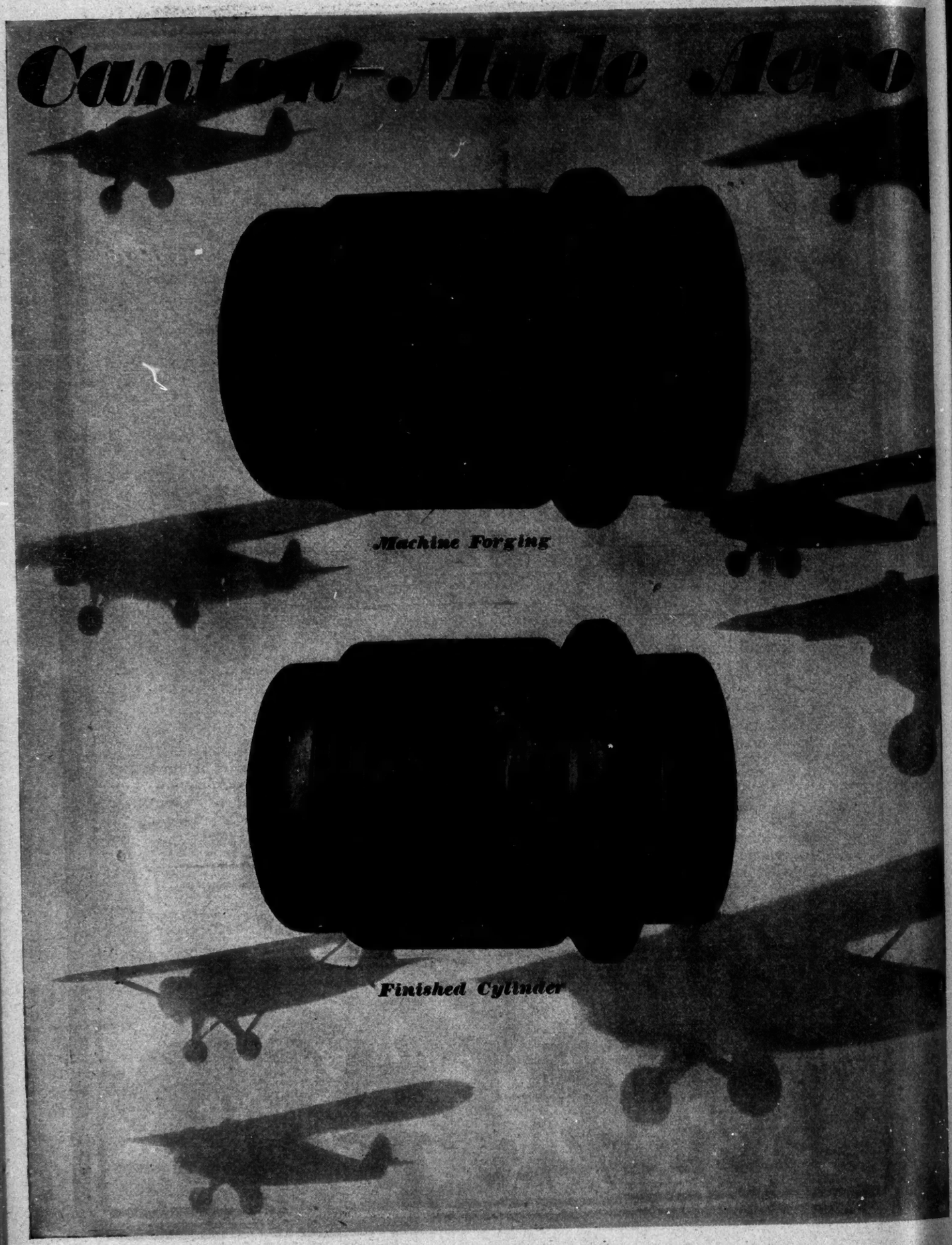
Many manufacturers of automobiles have long depended upon Agathon Alloy Steels for parts that must withstand great stress and strain. It is fitting therefore, that they have gone into the vital parts of thousands of planes—making them safer, better, stronger.

In our laboratories—the most modern in America—a staff of expert metallurgists, are constantly working to evolve even better steels.

If you have any problems why not allow our metallurgists to assist you? The service is free and involves no obligation on your part. Consider what it may save you. Write us.

CENTRAL ALLOY STEEL CORP.
Massillon and Canton, Ohio
World's Largest and Most Highly Specialized Alloy Steel Producers

AGATHON
ALLOY STEELS


Cantar-Made Aero
Machine Forging
Finished Cylinder

The Heart is . . .

THE Canton D… Company of Canton, … has been engaged in the manufacture of … engines for … years. Recently, … using a … they have erected … National Machine (the larg… … to insure customers unin… … cylinder requirements.

…ged by this method show a marked refinement … result of the internal "working" provided by … addition, these forgings are true to size, and … of the finished cylinder. The savings in weight … the fact that the forg… whereas, the Canton …

…Machines with Nati… forging practice … and symmetri… them.

…can obtain such forgings from any commercial forging shop equipped with this new style National High Duty Forging Machine—or if you will … us, our engineers will be glad to report.

A 7½ inch National High Duty Forging Machine, the largest and most powerful forging machine in the world.

National High Duty Forging Machines are sold by

CHAMBERSBURG-NATIONAL

COMPLETE FORGING EQUIPMENT

Offices at

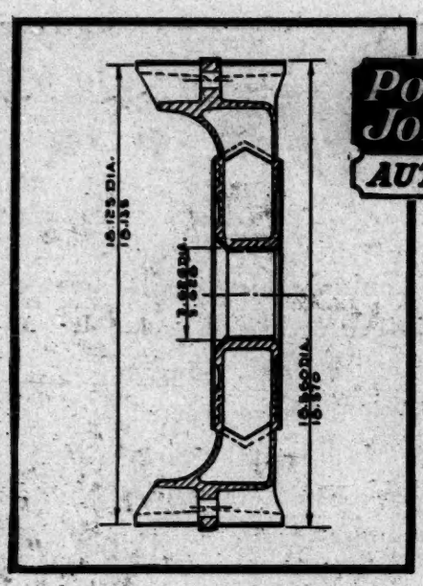
CHAMBERSBURG, PA. TIFFIN, OHIO

NEW YORK, … W. 42nd St. CHICAGO, …

DETROIT, …

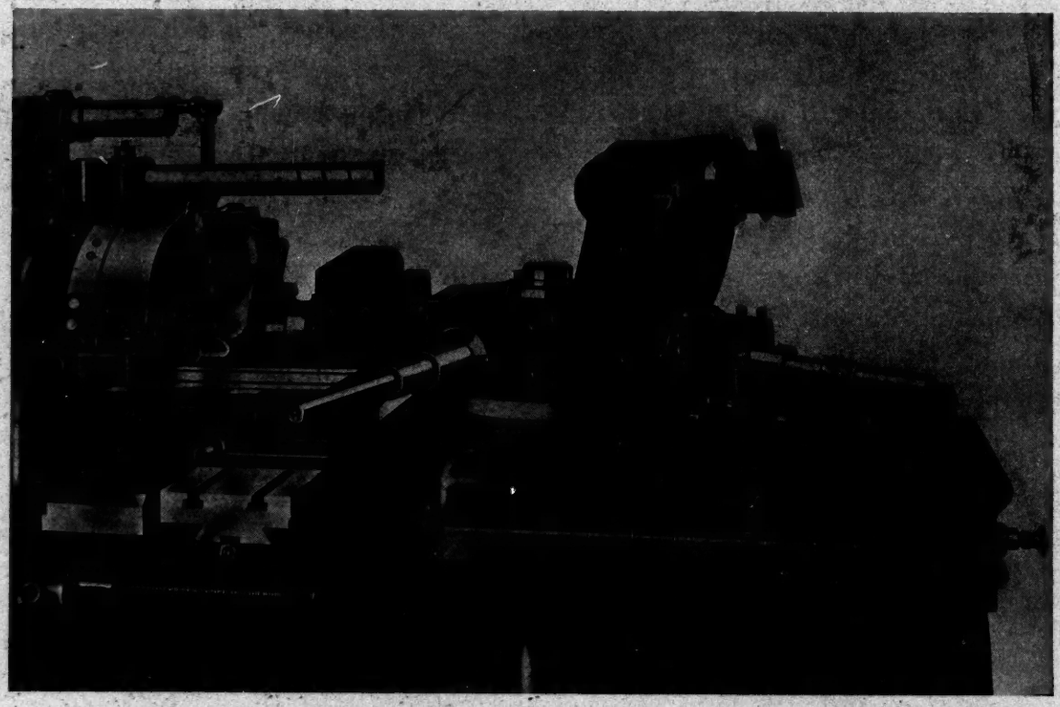
The National M… Company

Tiffin, Ohio, U. S. A.



POTTER and JOHNSTON
AUTOMATICS

17 Malleable Iron Truck Wheels *per hour from a battery of* Four 5-D Automatics



The increasing use of malleable iron and steel truck wheels has presented another problem to the manufacturer.

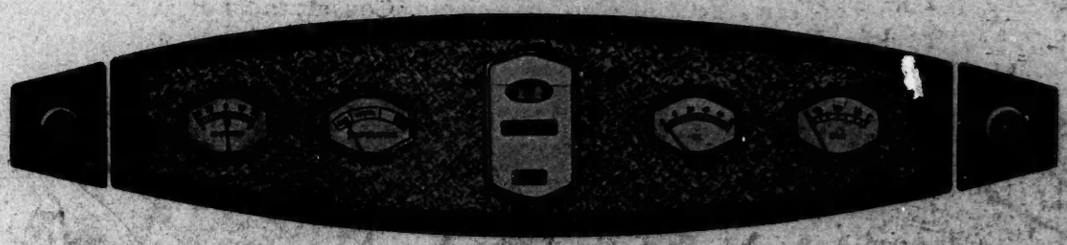
The P & J line of automatics has solved this problem in the largest plants producing truck wheels.

Your particular problem may not be truck wheels, but as the range of work handled on P & J Automatics is almost unlimited, the receipt of your subject prints will enable our engineers to give you figures which will indicate the substantial savings which can be made on your class of work.

POTTER & JOHNSTON MACH. CO.
Pawtucket, Rhode Island, U. S. A.

P&J *Automatics*

NAGEL EXPERIENCE RESULTS IN NAGEL PRECISION



Nagel equipment—whether complete panels or separate instruments has gained its solid standing among automobile manufacturers on account of its uniform accuracy and precision. Thirty years of precision manufacture stand back of Nagel's reputation and thirty years' experience make this precision possible.

Nagel instruments are efficiently serviced by experienced Nagel service men at authorized Nagel service stations spread throughout the country.

Our engineers will be glad to cooperate with yours in the design of complete panels or individual instruments to meet your special needs.

NAGEL ELECTRIC COMPANY
TOLEDO • OHIO

Pacific Coast Offices:
451 Rialto Bldg., San Francisco, Calif. 53 Fourth Street, Portland, Oregon
Canadian Representative: Auto Electric Service Co., Ltd., 252 Victoria Street, Toronto, Canada

Besides airplanes, motor trucks and motor boats, Nagel supplies instruments or panels for the following well-known motor cars:

Auburn	Durant Star	Reo Flying Cloud —the Master	Studebaker
Cadillac	Jordan		Stearns-Knight
duPont	LaSalle	Reo Flying Cloud —the Mate	Whippet
Durant	Pierce Arrow		Willys-Knight

NAGEL

Heat Indicators • Gas Gauges
Oil Pressure Gauges • Oil Level Gauges
Ammeters • Cigar Lighters and Complete Panels

This sign identifies Nagel authorized service stations

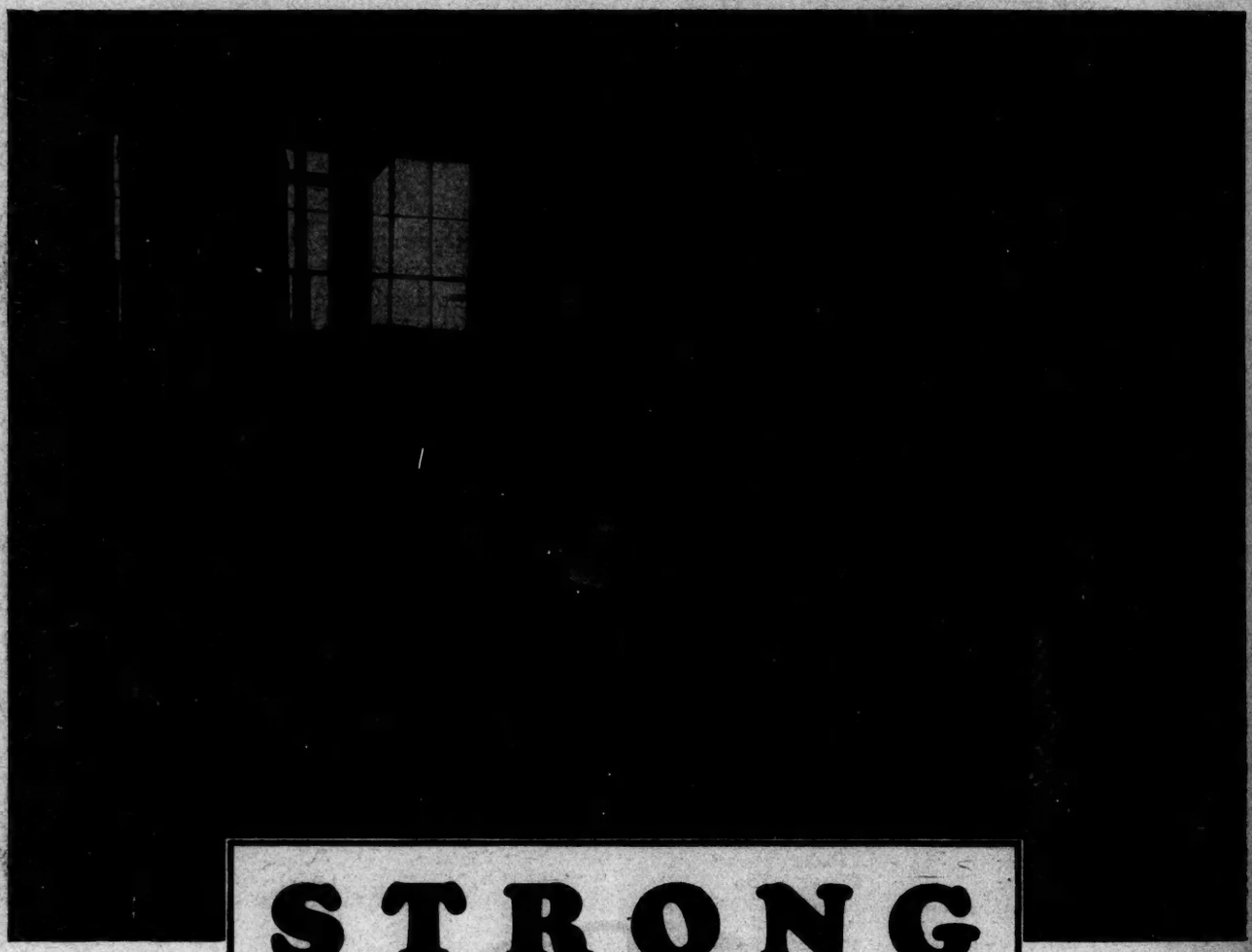
and is a sign of efficient, intelligent craftsmanship

Annealing wire for weaving

BRASS and phosphor bronze wire cloth is made in this big plant to exacting specifications of one of the most important basic industries. And continuous production is largely dependent upon the absolute reliability of this S C & H electric double furnace.

Annealing precedes each drawing to size, and from two to four anneals are required to prepare the metal thread for the big looms, using wire as fine as .004 inch in diameter. Tensile strength must be exactly uniform for thread breakage cannot be tolerated.

Many important manufacturers rely upon the years of experience of *Strong, Carlisle & Hammond* Engineers in the designing, building and installation of industrial furnaces. Consult them on your heat treating production requirements.



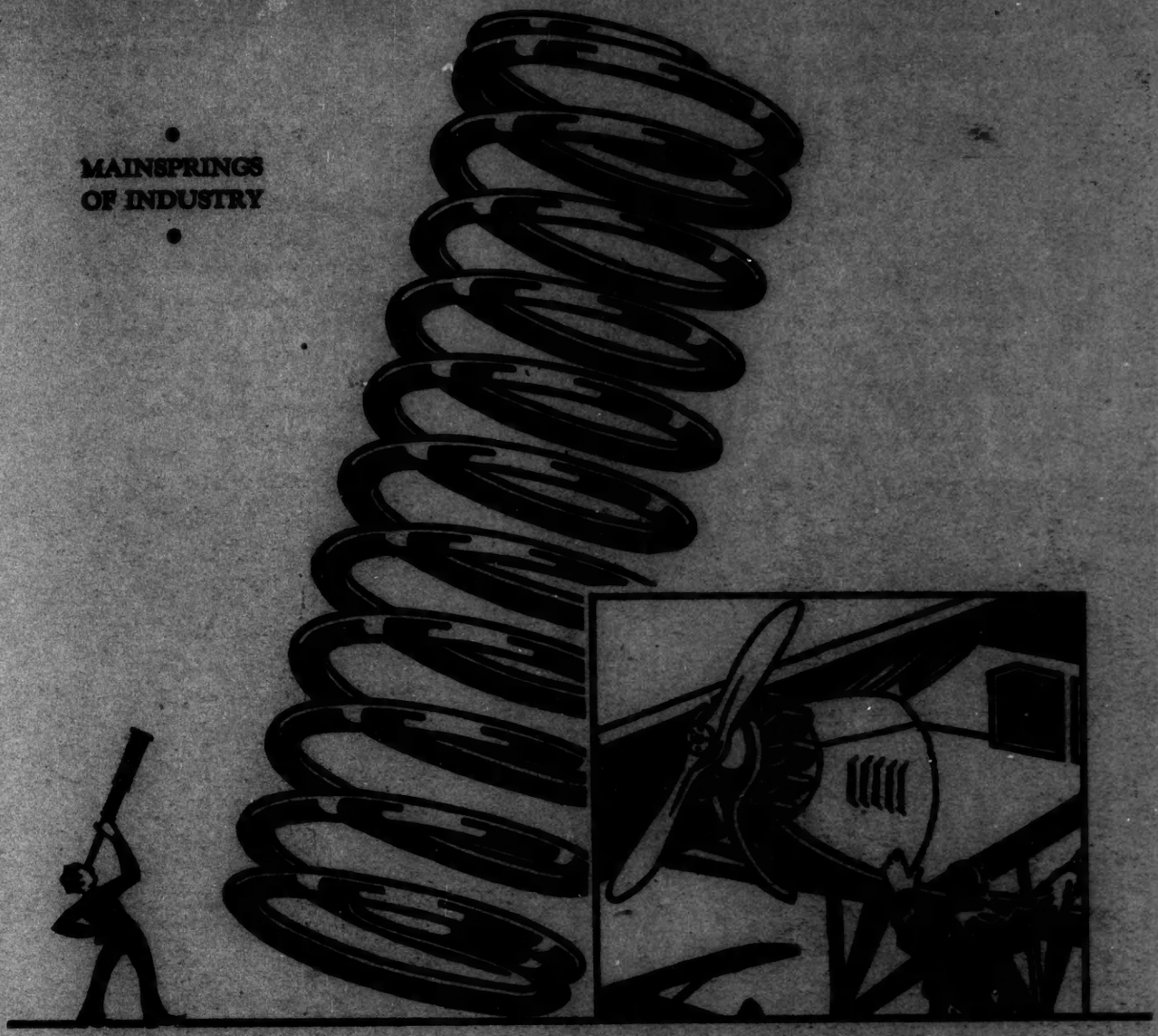
STRONG CARLISLE & HAMMOND

SC&H Furnaces are built in all sizes of Oven, Pot, Continuous, and Special Types for Electric, Oil or Gas application.

SC&H Furnaces are made for annealing, case hardening, carburizing, forging, cyaniding, lead hardening, oil tempering, etc.

INDUSTRIAL FURNACE MANUFACTURERS · CLEVELAND, OHIO

MAINSPRINGS
OF INDUSTRY



If it's DEPENDABILITY *you want*—

to keep your ***Production Lines*** on the move, Barnes-made springs have been building a reputation for dependable service for years. Won't you tell us your spring requirements —one or a million?

THE WALLACE BARNES CO., BRISTOL, CONN., U.S.A.

Barnes made SPRINGS

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SPRING WASHERS ASSEMBLIES
SCREW MACHINE PARTS
SMALL STAMPINGS

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Products of Industry,
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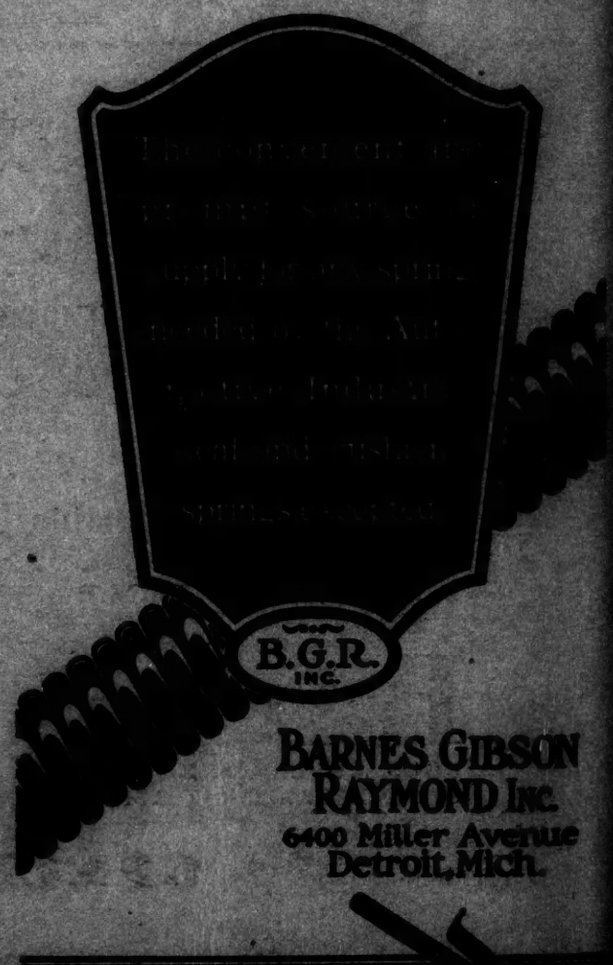
Send us your inquiries for Estimates.

Raymond Mfg. Co.
CORRY, PA.



BARNES GIBSON RAYMOND INC.
6400 Miller Avenue
Detroit, Mich.

ALWAYS QUIET

ALWAYS DEPENDABLE

Genuine Morse Silent Timing Chains set the standard of performance in the field of automotive timing equipment. Always quiet, efficient and trouble-free, they are the outstanding choice of automotive engineers for cars in every price class.

The correctness of their design and the superiority of their performance have been tried and proven in the most exacting of all testing laboratories—daily service on millions of cars, trucks and buses.

Proof of their superiority is evidenced by the fact that the large majority of automotive vehicles employing front end chain drives are Morse equipped. Read the list of manufacturers using Morse Silent Timing Chains as standard equipment and you cannot help but recognize their leadership. Sixteen years of almost unanimous acceptance on the part of the automotive industry is conclusive proof of Morse Chain quality.

MORSE CHAIN COMPANY

Main Office and Works
ITHACA, NEW YORK

Sales and Engineering Office
DETROIT, MICHIGAN

MORSE

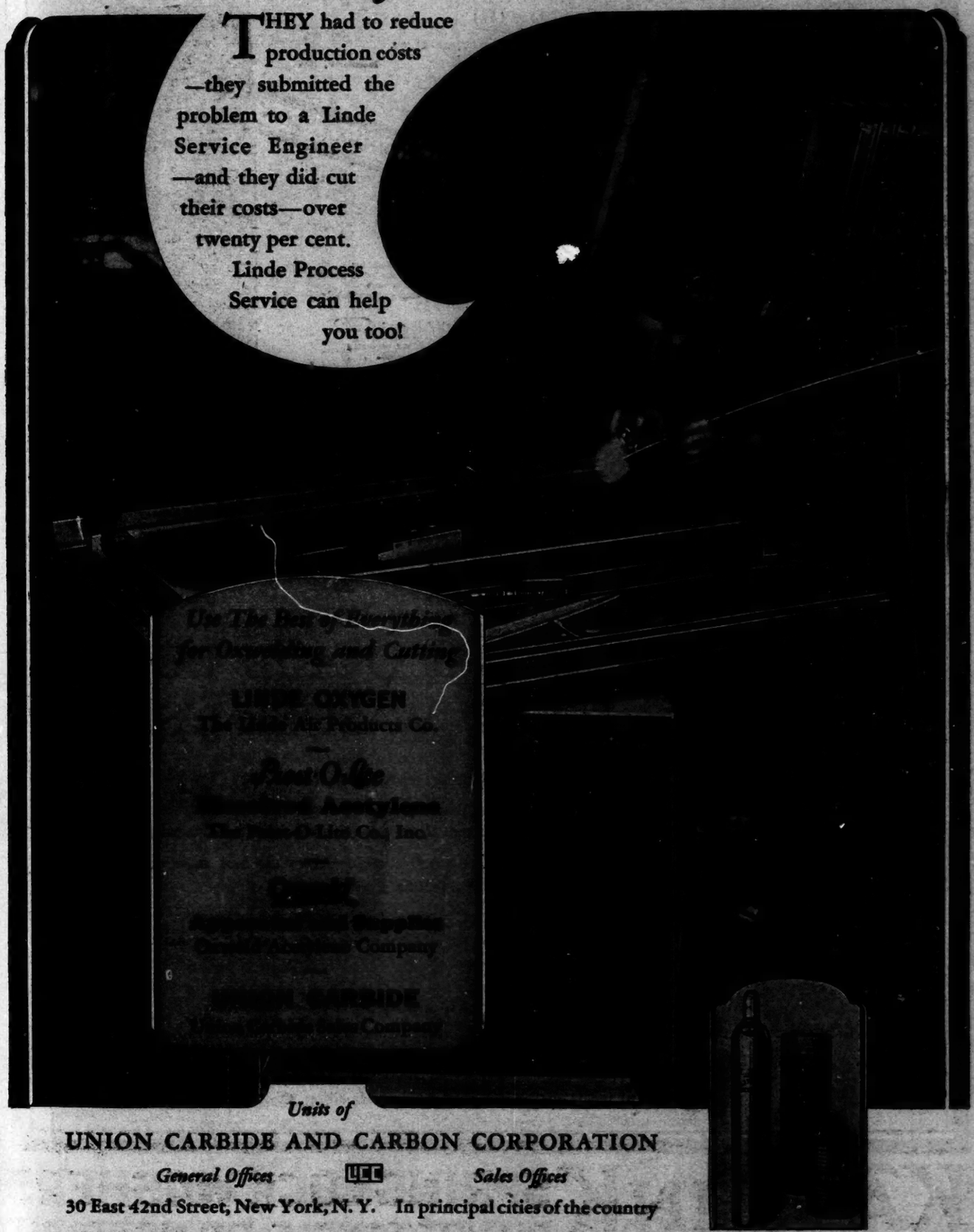
GENUINE *SILENT* CHAINS

for Smoother-More Flexible Longer Life CLUTCH PLATES

I.R.M. Co.
X-tra Quality
HIGH CARBON STEEL

INDIANA ROLLING MILL COMPANY
New Castle, Indiana
Division of
Galesburg Coulter-Disc Co.

—and they did cut their costs!


THEY had to reduce production costs —they submitted the problem to a Linde Service Engineer —and they did cut their costs—over twenty per cent. Linde Process Service can help you too!

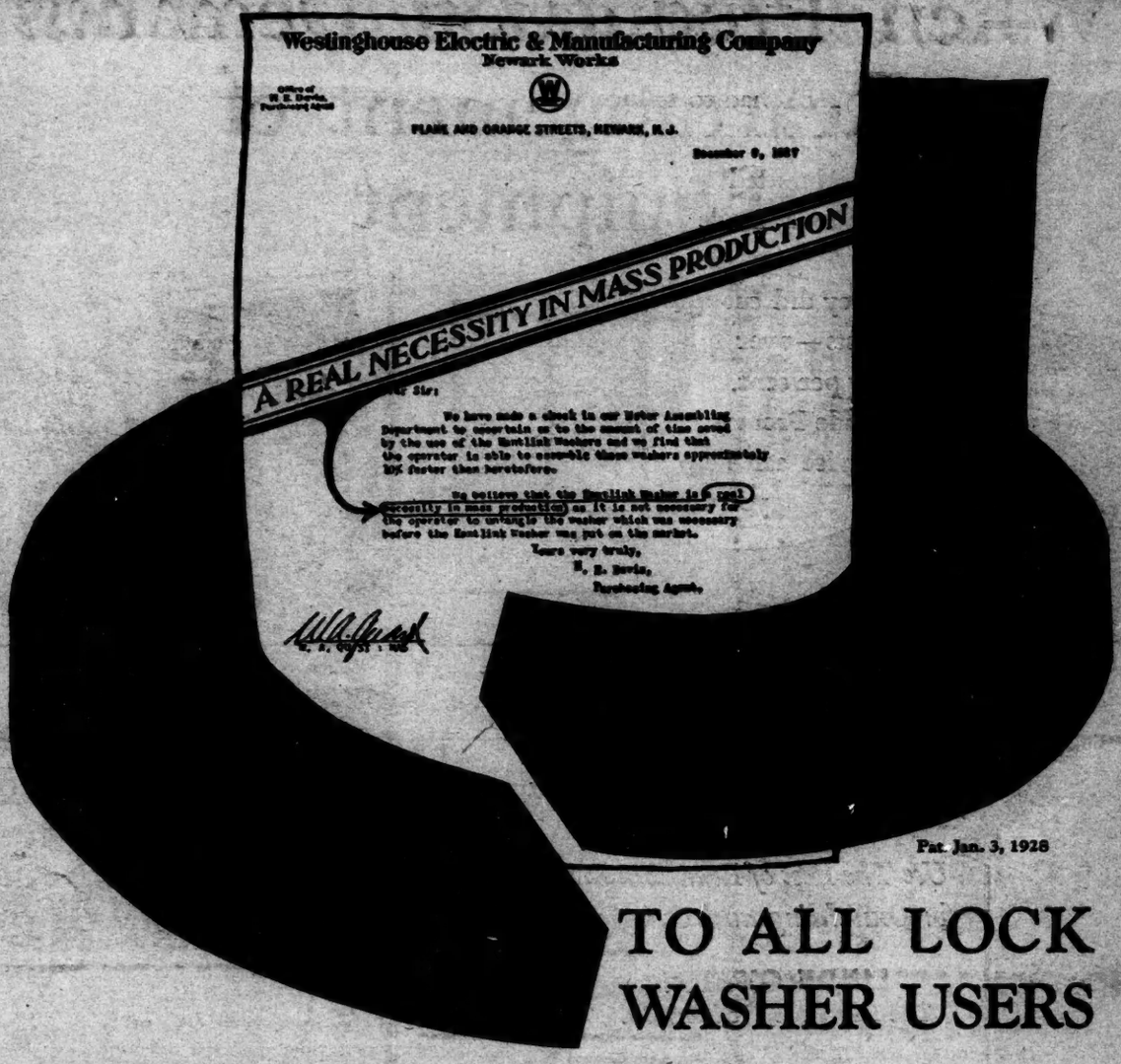
Units of

UNION CARBIDE AND CARBON CORPORATION

General Offices UCC *Sales Offices*

30 East 42nd Street, New York, N. Y. In principal cities of the country

64 Linde Plants—45 Prest-O-Lite Plants—154 Oxygen Warehouse Stocks—138 Acetylene Warehouse Stocks—38 Apparatus Warehouse Stocks —235 Carbide Warehouse Stocks


Westinghouse Electric & Manufacturing Company
Newark Works
PLANE AND ORANGE STREETS, NEWARK, N.J.
A REAL NECESSITY IN MASS PRODUCTION
We have made a check in our Meter Assembling Department to ascertain as to the amount of time saved by the use of the Kantlink Washers and we find that the operator is able to assemble these washers approximately 10% faster than heretofore.
We believe that the Kantlink Washer is a real necessity in mass production as it is not necessary for the operator to untangle the washer which was necessary before the Kantlink Washer was put on the market.
Yours very truly,
H. E. Davis,
Purchasing Agent.
Pat. Jan. 3, 1928

TO ALL LOCK WASHER USERS

Westinghouse made tests—read what they say.

"We have made a check in our Meter Assembling Department to ascertain as to the amount of time saved by the use of the Kantlink Washers and we find that the operator is able to assemble these washers approximately 10% faster than heretofore.

"We believe that the Kantlink Washer is a real necessity in mass productions, as it is not necessary for the operator to untangle the washer which was necessary before the Kantlink Washer was put on the market."

You can save money also.

Many manufacturers save enough time by using Kantlinks to more than pay their entire lock washer cost.

Kantlinks do not tangle—they do not rust—and they have greater holding power.

Let us send you a trial order for a test in your own plant. Write today to any one of the manufacturers listed below.

Made and sold under license by the Kantlink Manufacturers:

The American Nut & Bolt Fastener Co.
Pittsburgh, Pennsylvania

The Mansfield Lock Washer Co.
Mansfield, Ohio

The National Lock Washer Co.
Newark, New Jersey

The Positive Lock Washer Co.
Newark, New Jersey

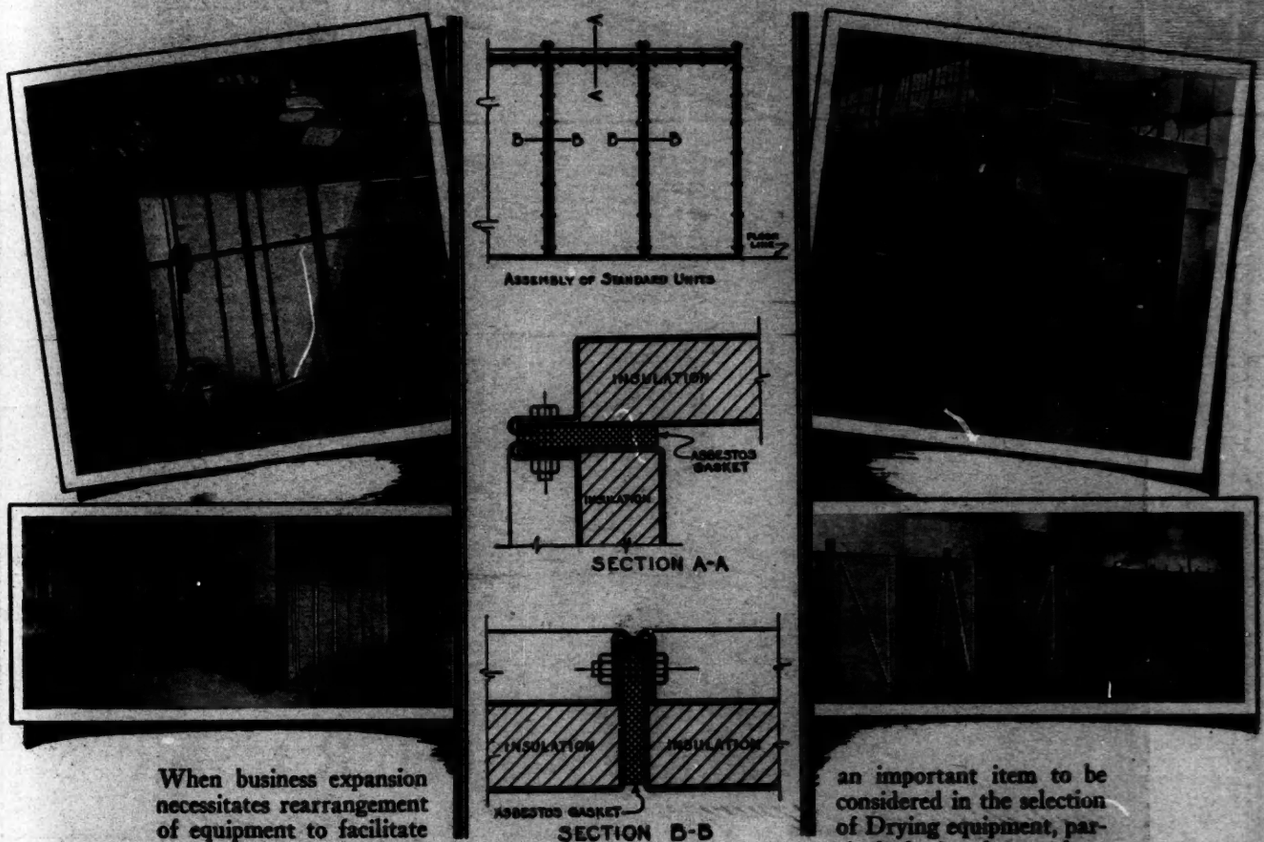
The Reliance Manufacturing Co.
Massillon, Ohio

3013-3068

KANTLINK TRADE MARK SPRING LOCK WASHERS
DO NOT TANGLE DO NOT RUST

THEY PAY THEIR ENTIRE COST IN TIME SAVED—SOMETIMES EVEN MORE

When Production Demands Rearrangement of Equipment



When business expansion necessitates rearrangement of equipment to facilitate new production systems, the advantages embodied in Mahon Drying Ovens are keenly realized. ¶The standard unit construction, with all insulation completely enclosed in metal, permits 100% salvage . . . . these ovens may be dismantled and re-erected in a new location, in any size or shape to meet individual requirements, without damage to the insulating material. ¶This feature is an important item to be considered in the selection of Drying equipment, particularly in plants where frequent changes in production lines are necessary. ¶Mahon Industrial Drying Ovens are fireproof and waterproof . . . . they are easily cleaned and require no maintenance whatever. ¶Consult Mahon engineers before you select your next Drying Oven . . . . let them show you the advantages of standard unit construction—write today.

THE R. C. MAHON COMPANY

DETROIT, MICHIGAN

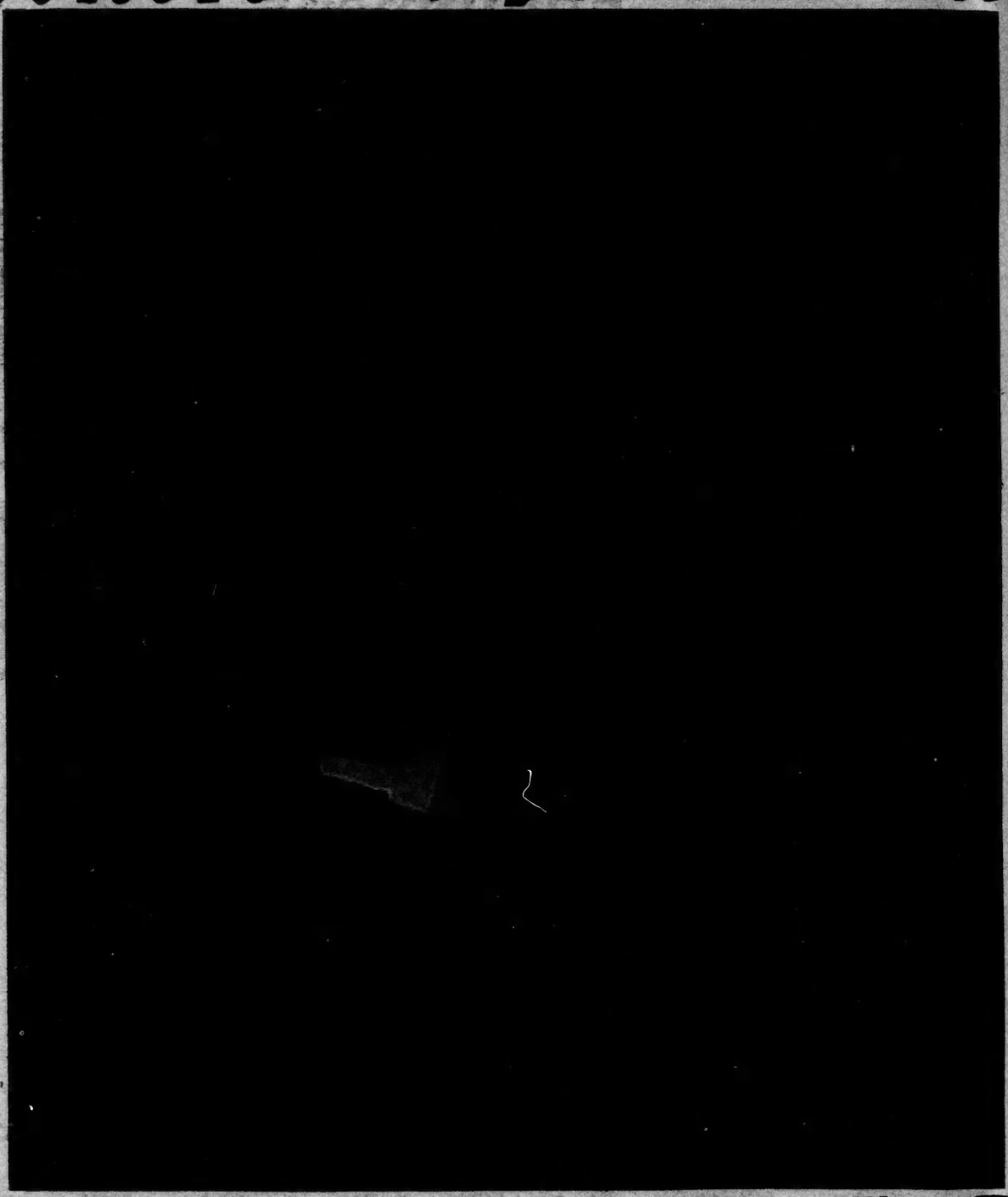
Manufacturers of Industrial Drying Ovens, Spray Booths and Exhaust Stacks, Blow Pipe and Dust Collecting Systems

MAHON

INDUSTRIAL DRYING OVENS

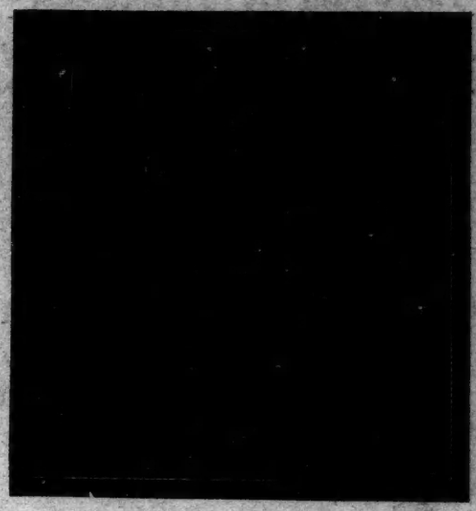
BUILT FROM STANDARD INSULAT D UNITS

Where Requirements



ILLINOIS

ts are most Exacting!



The steering knuckle... is there any other single part of an automobile that carries so much responsibility; any other that is called upon to do so much to safeguard the car and its occupants? . . . . . The photograph shown on the opposite page is taken in the plant of a manufacturer who uses ILLINOIS ALLOY because investigation has demonstrated to him the care with which this steel is made and rolled. Clean steel of sound homogeneous structure, carefully inspected all along the line, is the first essential to a safe and dependable product! . . . . . Our engineers will gladly co-operate with you in working out your alloy problems.

Illinois Steel Company

Subsidiary of United States Steel Corporation

General Offices: 208 South La Salle Street, Chicago, Illinois

ALLOY STEEL

BLACK & DECKER
PORTABLE ELECTRIC SANDER

...*llentown, Pa.*,
...ers of the famous *CV
... Vanadium Wrenches, say
...s is one of the greatest time
savers they have ever had in their
shop.

Cleaning dies in the plant of Bonney Forge & Tool Works with a Black & Decker Portable Electric Sander.

BLACK & DECKER

Toronto, Ontario, Canada — TOWSON, MD., U. S. A. — Slough, Bucks, England

Spray Systems for Every Division of the Automotive Industry

THE service which The DeVilbiss company renders to the automotive industry does not stop with spray systems and installations serving the manufacturer, though the automobile builder recognizes DeVilbiss as the outstanding supply source for all such equipment. DeVilbiss serves with equal efficiency car dealer, service man, and car owner by providing spray-finishing outfits of suitable capacity and at prices that enable all factors handling, servicing, and using cars to economically and easily keep them in the condition that the manufacturer always wants to see his product.

Manufacturers' service departments recommend DeVilbiss outfits, and the whole industry benefits from their use by distributor, dealer, service man and owner.

Our new catalog of DeVilbiss equipment for use in the entire automotive field will be sent promptly on request. Learn how DeVilbiss serves throughout the entire structure of automobile manufacturing and merchandising.

Spray guns of various types and sizes.
Pressure feed paint tanks and containers.
Spray booths, exhaust fans, and approved lighting fixtures.
Air compressing equipment.
Air transformers and accessories.
Air and fluid hose and connections.
Complete outfits from the smallest hand-operated units to the largest industrial installations.

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302 Phillips Ave., Toledo, Ohio
Sales and Service Branches
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DeVilbiss
Spray-PAINTING FINISHING System

Precision

True precision in the manufacturing is one reason for the great and constant increase in the popularity of the interchangeable type of Bohn Ring True Bearings.

No hand fitting—no reaming at assembly. Machined to precision limits. Maximum variation in essential dimensions does not exceed .00025.

BOHN ALUMINUM & BRASS CORP., DETROIT, MICH.
New York Chicago Philadelphia Cleveland Pittsburgh

Every sales manager's prayer:

How can we pep up sales?

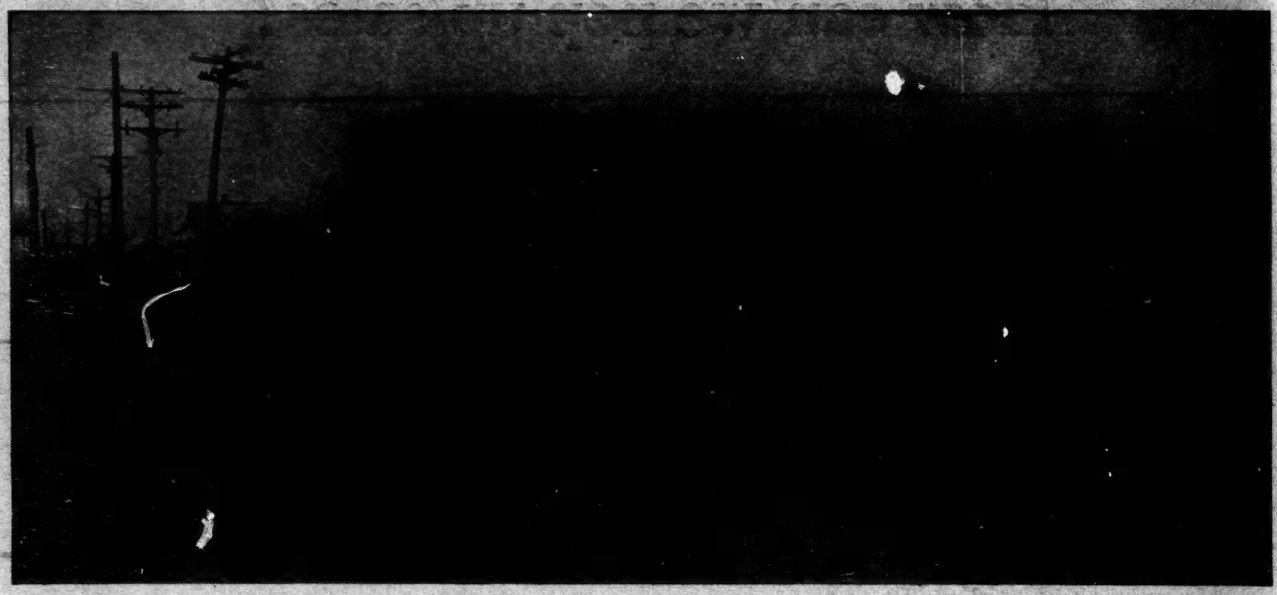
USE

NELSON

BOHNALITE

PISTONS

Greater Safety—
Greater Economy



WHEN trucks and trailers are equipped with the Westinghouse Air Brake, greater safety is assured—the driver has brake control of both vehicles and the protection of automatic application in case of a break-in-two. And, because shorter stops can be made than with mechanical brakes, much more economical operation results—higher schedule speeds and greater daily mileage.

The Southern Michigan Transportation Company has 26 trains like the one shown comprising a G.M.C. T-60 tractor with Fruehauf semi- and four-wheel trailer. They operate these units on the highway at a speed of 25 miles per hour and claim that this speed would be impossible without Air Brake control.

Manufacturers are giving impetus to truck and trailer operations, with its resultant economic advantages, by adopting Westinghouse Air Brakes.

WESTINGHOUSE AIR BRAKE COMPANY

Automotive Brake Division: **WILMERDING, PENNA.**

WESTINGHOUSE
AUTOMOTIVE AIR BRAKES

stamina

MADE OF THE FINEST high carbon chrome alloy steels, Federal Radial Ball Bearings possess unusual *stamina.* Long life and dependable wear are characteristics of these bearings—characteristics which mean economy and absence of trouble. Consequently, the performance of "Federals" is just as pronounced as their quality. That is why manufacturers select Federal Radial Ball Bearings in preference to ordinary bearings.

We shall be pleased to forward samples, quotations and complete information to those interested.

The FEDERAL BEARINGS CO., *Inc.* POUGHKEEPSIE, N. Y.

Detroit Office 917 Book Building

FEDERAL

RADIAL BALL BEARINGS

To make sure that the user of your truck will get the full benefit of its inbuilt reliability use the ERIE Wheel—*"The Wheel of Today and Tomorrow."*

Making a fast and reliable truck even better

From the very first day that the Reo Model "G" three-ton series went into production—in 1927—ERIE Dual Pneumatic Wheels have been standard factory equipment on these "Speed Wagons."

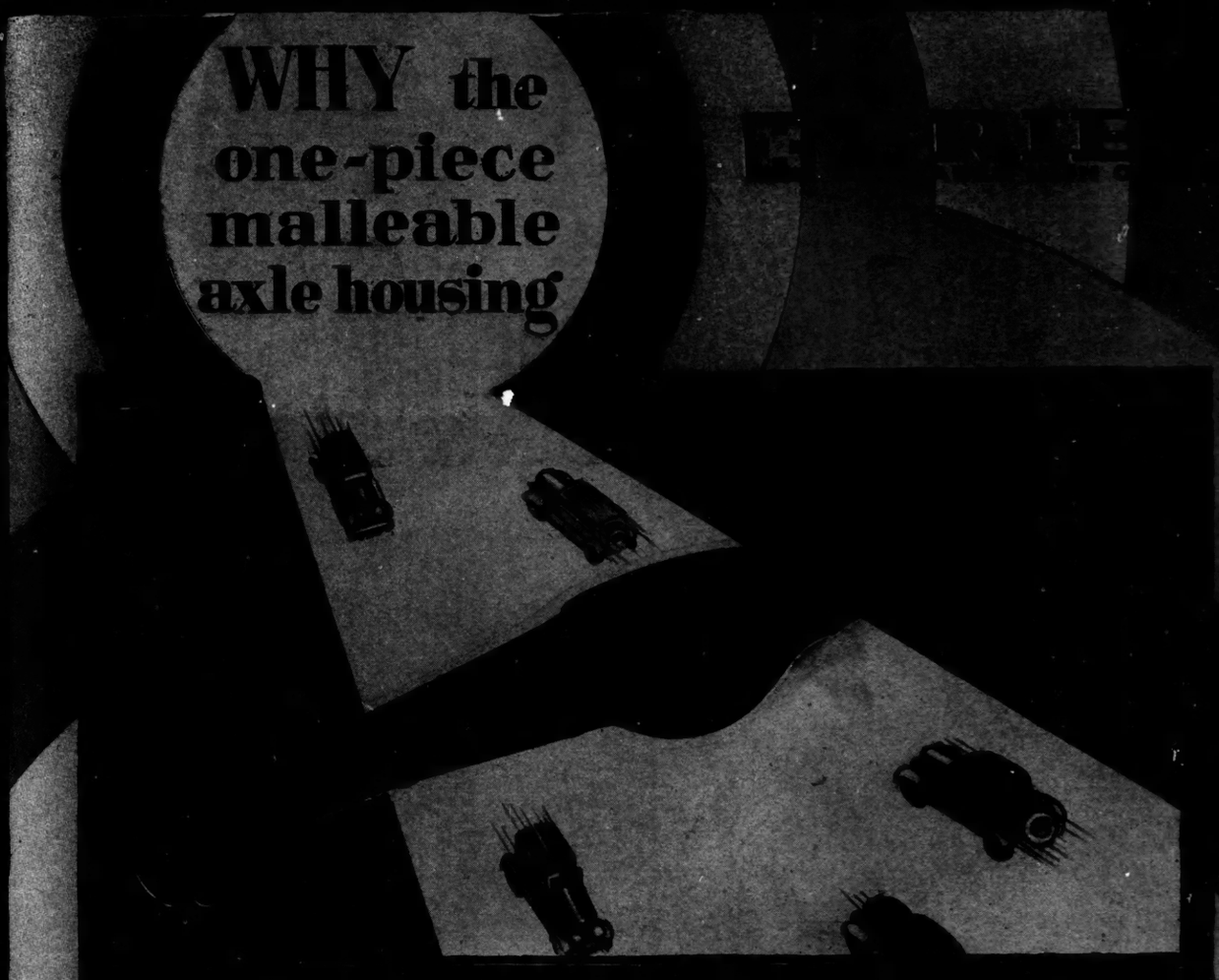
ERIE Wheels—developed and consistently improved by ERIE Malleable, pioneers of the spoke-type dual—give the users of trucks and buses added safety, convenience and reliability. More accurate aligning of tires . . . . easier dismounting . . . . better cooled drums, etc.

Several years ago "ERIE" originated the feature of converting a dual wheel into a "single" when desired, with the center line of the single tires practically the same as the duals.

REO SPEED WAGON

ERIE MALLEABLE IRON COMPANY
Automotive Wheel Division
Erie, Penna., U. S. A.

WHY the one-piece malleable axle housing



THE modern tendency of the passenger car engineer is to follow the trend of the truck designer, who several years ago adopted the one-piece malleable housing. Why? Check the reasons for yourself:

Tests have proven that it is a distinct aid toward Quiet Gear Operation.

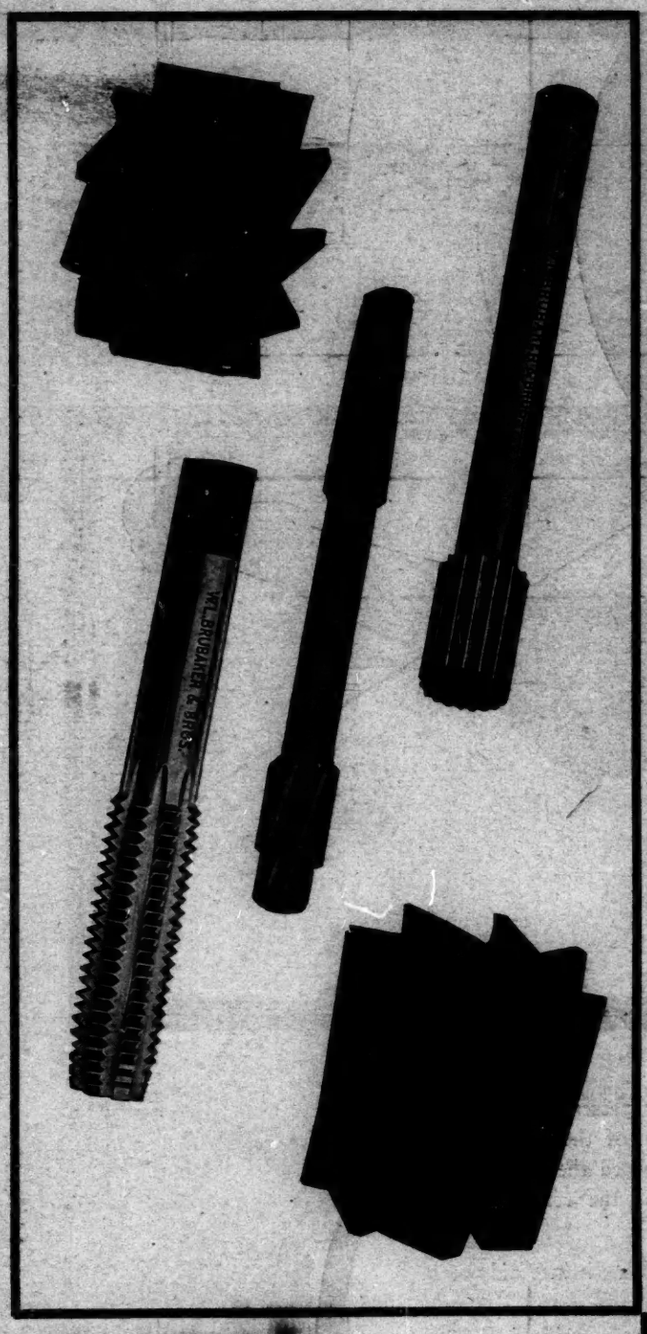
Even wall thickness and strength makes for Safety and Dependability.

Practically no heavier, as a complete unit, than a built-up housing.

Permits changes in the axle design at very little cost.

ERIE MALLEABLE IRON COMPANY
Foundry Division
Erie, Penna., U. S. A.

The Erie Malleable Iron Company, as the pioneer builder of one-piece cast axle housings, for light and heavy duty trucks, has cast over 200,000 housings, ranging in weight from 62 pounds to 195 pounds each.



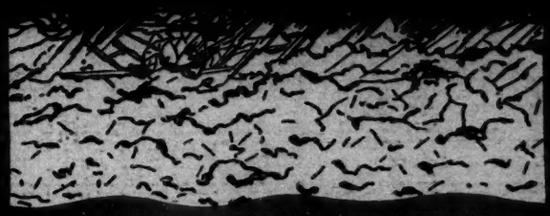
BRUBAKER

Throughout the machine shops of America the name of Brubaker means design and manufacture fully capable of meeting any small tool problem. This service is offered with a promise of LOWER TOTAL small tool expense wherever possible.

W. L. Brubaker & Bros. Company
Millersburg, Pa.

NITRIDED NITRALLOY

THE HARDEST KNOWN STEEL SURFACE



Even When Hot—It's Hard!

That's a test that Nitrided Nitralloy passes every day. In the hottest parts of automobile and aviation engines, on vital wearing parts of oil equipment and fire engines and in countless valves, dies, gears and cams, heat and wear are daily overcome by this new processing method of hardening Nitralloy Steels.

Nitrided Nitralloy retains its hardness up to 1400°F (low red heat), is moderately resistant to atmospheric and water corrosion; is far superior to carburized material, and has extreme resistance to sliding or rolling effects.

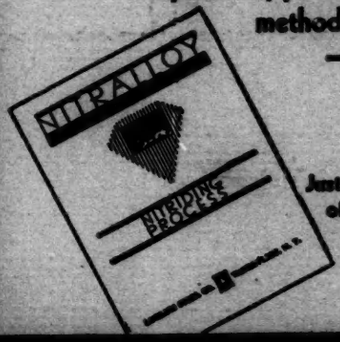
And It Resists Wear

Wherever You Have

Heat, Wear, Poor Lubrication, or Extreme Conditions

Use the Ludlum Nitriding Process

A practical, proven, quantity production method for hardening Nitralloy —a Ludlum alloy steel



WRITE FOR THIS BOOKLET—

Just off the Press; gives illustrations of applications and full description of methods and results obtained.

LUDLUM

NITRALLOY, STRAUSS METAL TOOL & ENDURO NIROSTA STEEL

A MULTIPLE-LIFE STEEL FOR WEAR RESISTANCE

Whether you manufacture machines—or use them—you will be interested in the economy obtained with Nitralloy for wearing surfaces. For sliding or rolling wear it means doubled—trebled—multiplied life. In many cases, 30 times the length of service has been obtained—a truly remarkable advantage over the best of former materials. Somewhere you have conditions of wear which Nitralloy will greatly improve.

Ludlum representatives are prepared to co-operate with you in overcoming losses heretofore deemed unavoidable.

In the meantime, write for this booklet: «Nitralloy and the Nitriding Process.» It contains a complete description with illustrations and operating data.

Have you a copy of this booklet—«Enduro KA2 Steel»—a comprehensive description of this outstanding steel?

Its field of value includes all industries.

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trauss Metal (Tungsten Carbide)

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& State_____

Ludlum steels are modern—they include advanced analyses and heat treatments. Whether you need Tool or Die steels, Strauss Metal (tungsten carbide) for cutting, Nitralloy for wear resistance, or Enduro Nirosta for corrosion and heat resistance, you will find the Ludlum mills at your service.

LUDLUM STEEL COMPANY
NITRALLOY, STRAUSS METAL

WATERVLIET AND DUNKIRK, NEW YORK
TOOL & ENDURO NIROSTA STEELS

2075

LUDLUM STEEL COMPANY

a 77% cut

chining costs

Do you have a job where a 77% cut in machining cost would be of interest?

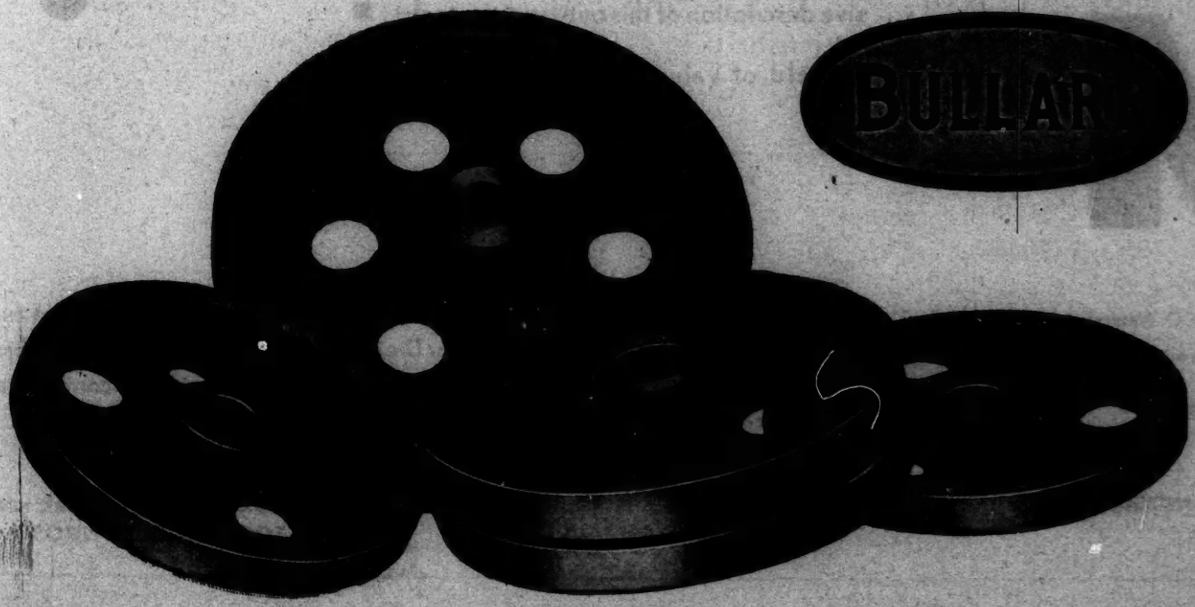
In one plant, previous to Mult-Au-Matic installation, the cost of machining semi-steel timing gear blanks was $0.135 per gear. The present cost with The Mult-Au-Matic Method which performs ten operations in one set-up per machine is $0.03 per gear.

Three Bullard Mult-Au-Matics have replaced 30 semi-automatic lathes on this work and each machine is saving this firm $19,653.40 annually.

Some of the many advantages of the Mult-Au-Matic Method are less floor space, lower tool cost, less labor, minimum spoilage and periodical inspection.

Why not let us show you how much Mult-Au-Matics will save on your work.

The Bullard Company
Bridgeport, Conn.



"HOW TO MAKE YOUR DIRECT MAIL ADVERTISING PAY"

COMPLETE DIRECT MAIL SERVICE

Research	Multigraphing
Plans	Addressing
Copy	Bindery
Art	Mailing
Printing	

We have just prepared a special 24 page booklet containing information that is vitally important to you.

It tells you how to make YOUR Direct Mail Advertising pay. It is entirely practical — having been prepared as a result of the experience we have gained during the past 10 years in planning, preparing and mailing millions of Direct Mail pieces for manufacturers in the automotive industry.

You should have a copy of this book. We will be glad to send you one. Write us today—or use the form below.

Direct Mail Division
CHILTON CLASS JOURNAL CO.
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Chilton Class Journal Company
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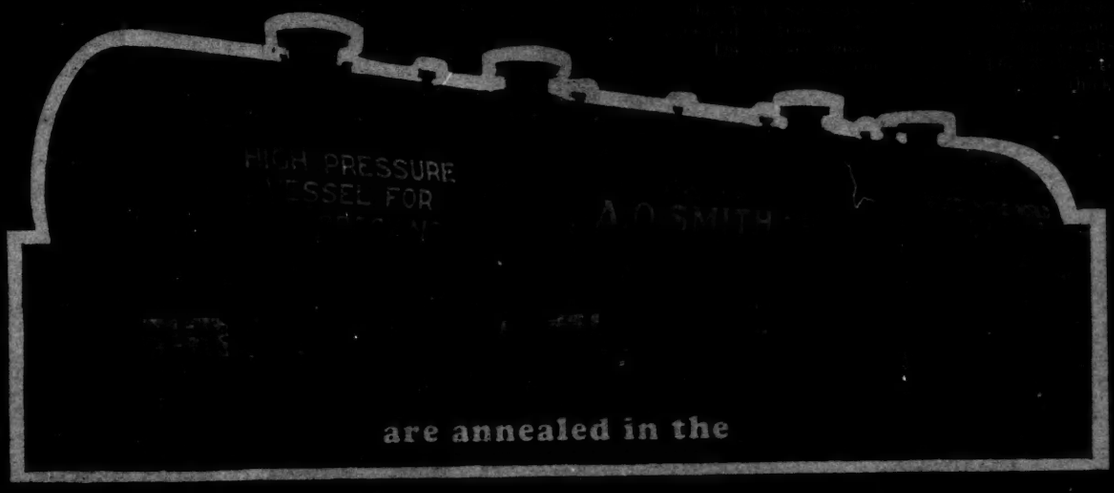
Send me a FREE copy of your booklet "How to make your Direct Mail advertising pay."

Company Name .....

Address .....

Attention of Mr. .....

The World's Largest Oil Stills



are annealed in the

World's Largest Electric Furnace

The [illegible] annealing furnace in the world, contains over [illegible] of nickel-metallic heating elements. The [illegible] provides the exceptionally close temperature control necessary to [illegible] heat treatment and [illegible] temperature throughout the charge. [illegible] and development.

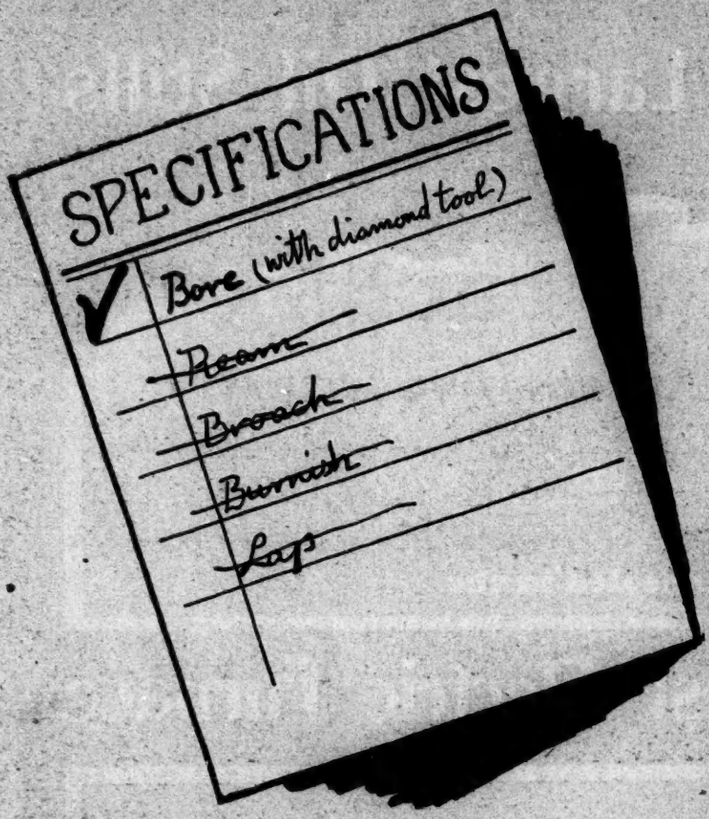
built by

The Electric Furnace Co., Salem, Ohio

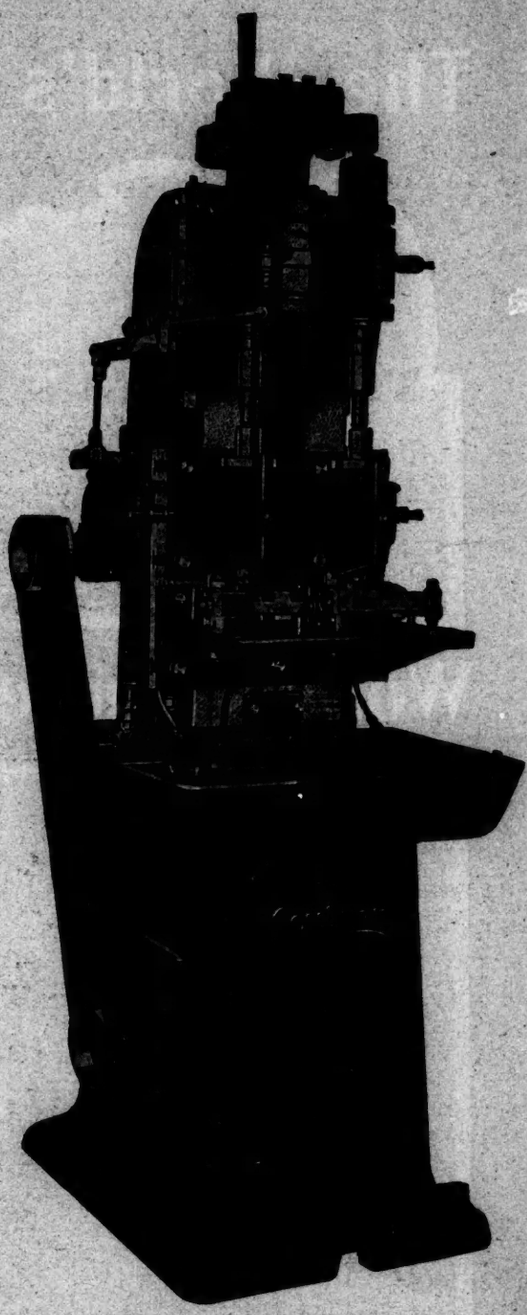
Builders of Heat Treating Equipment for Any Requirement
[illegible]

— Send For Booklet Showing This and 67 Other Installations —

FOUR OUT OF FIVE ELIMINATED . . . . . .



WITH Coulter Automatics DIAMOND TOOL BORING MACHINES



any one or more of these four operations can be eliminated, effecting savings of productive time, equipment and operating expense. COULTERS will finish-bore to maximum accuracy at lowest cost per piece.

Proof is yours for the asking—mail prints now and get our estimate of savings on your own product.

Made in single or double spindle with special tools and fixtures for your particular job.

"THE Coulter Automatics FAMILY"

Diamond Tool Boring Machines—Automatic Threading Lathes—Hob Thread Milling Machines—Automatic Profiling Machines—Open-side Shaper Planers—Rubber Heel Volumetric Blanking Presses.

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"Outlast the Factory"

Throughout the Automotive Industry

Kreolite Wood Block Floors have played an important part in every branch of the industry. Representative of the many big automobile accessory plants in which vast areas of Kreolite Wood Block Floors are now giving satisfactory service are:

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Made from thoroughly air-seasoned timber and laid with the tough end-grain uppermost, they give the maximum of strength, durability, service and economy.

THE JENNISON-WRIGHT CO.
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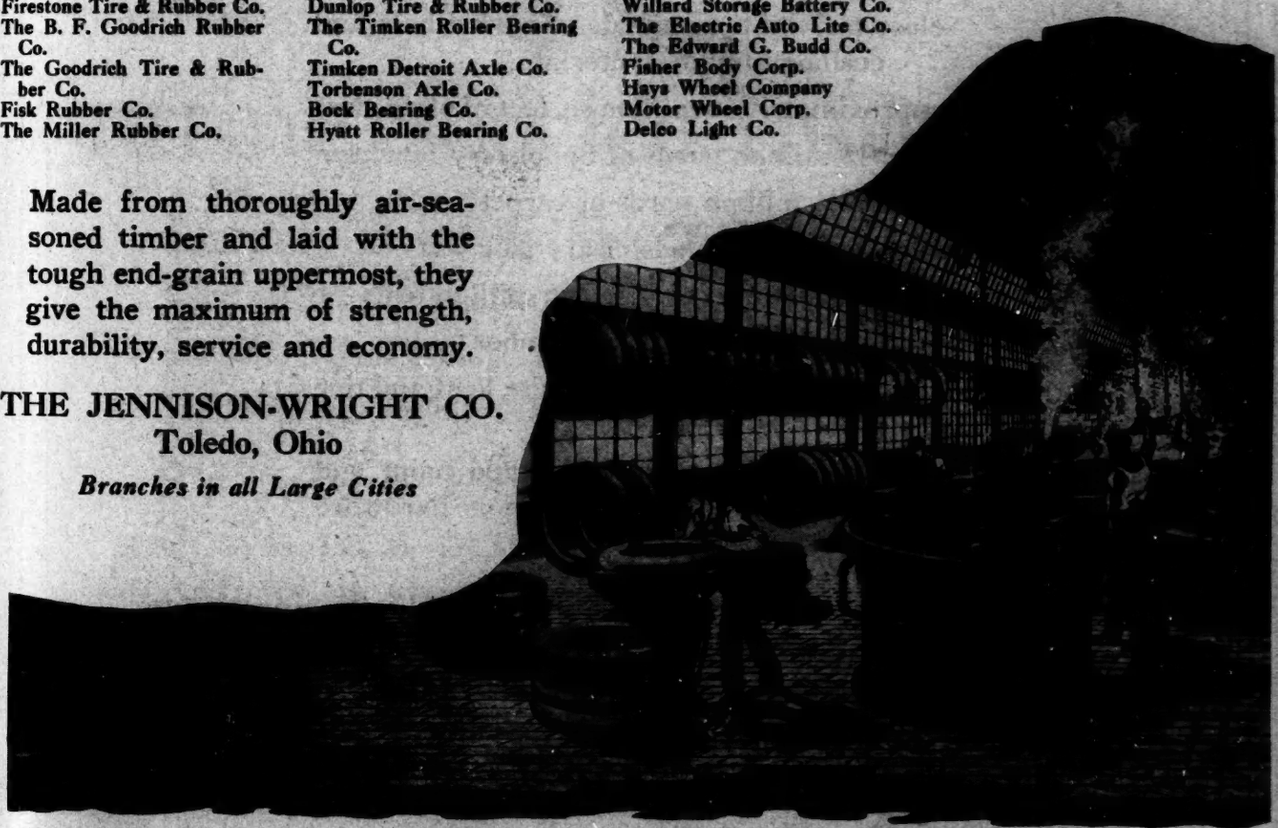
Branches in all Large Cities



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3,000,000
PASSENGER CAR BODIES

are annually built by readers of Automotive Industries

This gigantic output makes an insistent and increasing demand for an immense mass of materials, including:

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—close to 7 million pounds of curled hair and cushion stuffing material
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Automotive Industries is in touch with various sources of supply for all kinds of automotive items. If you will return the coupon below with the items that interest you checked and designated, we will undertake to put you in touch with various sources of supply and to see that you are furnished with catalogs, prices, discounts and other buying information.

Subscribers' Service Dept., entirely free

Just Mail This Coupon

Note: This week's list is largely devoted to FACTORY EQUIPMENT, MATERIALS, SUPPLIES. Next week's list will be devoted to items used in the PRODUCT of automotive plants.

Information Will Follow.

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I am interested in buying information on the following items: (Please be sure to designate type of items you check).

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- ☐ Drills, electric .....
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- ☐ Furnaces, type .....
- ☐ Gauges, type .....
- ☐ Gears and pinions .....
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- ☐ Gear testing machs. .....
- ☐ Grinding machs., type.....
- ☐ Grinding wheels .....
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- ☐ Hangers, ball bearg.....
- ☐ Hobs .....
- ☐ Hobbing machs., type.....
- ☐ Hydraulic machs. .....
- ☐ Indicators, dial .....
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- ☐ Lathes, vertical .....
- ☐ Lapping machs., type.....
- ☐ Lumber, type .....
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- ☐ Machine tools, type .....
- ☐ Milling machs., type.....
- ☐ Motors, elec. type.....
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- ☐ Powerplants, industrial type .....
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- ☐ Riveting machs., type.....
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- ☐ Screw machines .....
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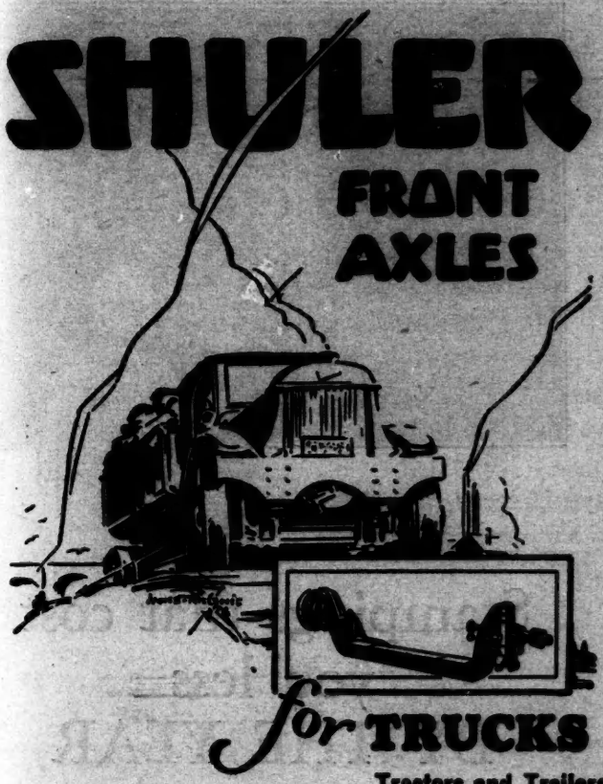

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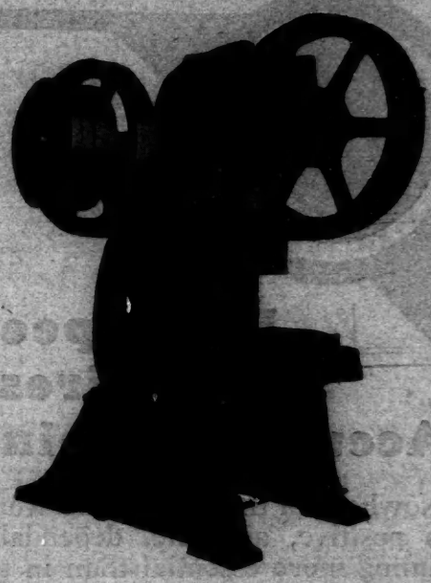

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Where pieced tinware, electrical apparatus, cans, brass goods, trimmings, etc., are being made, most of the operations can be performed with greatest speed, accuracy, and economy on Bliss Inclinable Presses. This type of press is adapted for nearly every kind of blank cutting, perforating, forming, and combination die work, and is in particularly wide use because of its exceptional range of usefulness and convenience of operation.

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Stampings that cost you less BY THE YEAR

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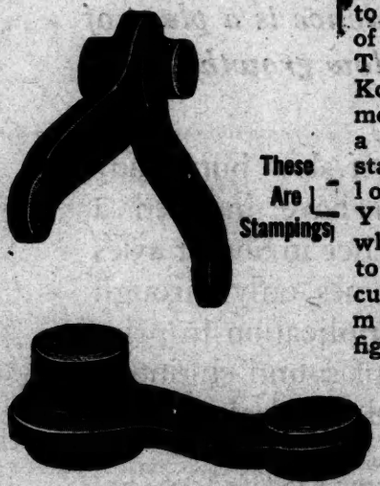

These Are Stampings

A better way is to count the cost of stampings BY THE YEAR. Konigslow customers are getting a price on their stampings that is low BY THE YEAR. This is why they continue to be Konigslow customers. Estimates gladly figured.

KONIGSLOW

STAMPINGS

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Drills, Reams, Slots Piston Pins—*simultaneously*

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This latest MILLHOLLAND mills the slot on one end of a piston pin while it drills and reams the transverse hole on the other end. Unskilled operator merely loads and unloads work fixture. All the well-known MILLHOLLAND features—individual electric motor drive for each head, air-chucks, automatic feeds, etc.

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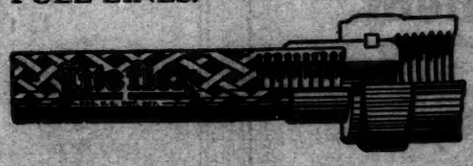
BY TWELVE YEARS OF SATISFACTORY SERVICE, TITEFLEX, THE ALL-METAL FLEXIBLE TUBING, HAS PROVEN ITS ABILITY TO ELIMINATE BROKEN FUEL LINES.



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Spots Loads Quickly

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THE MATHER SPRING CO., TOLEDO, OHIO

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The advertising pages of Automotive Industries are loaded with information which has direct, definite and up-to-the-minute value for you and your company.

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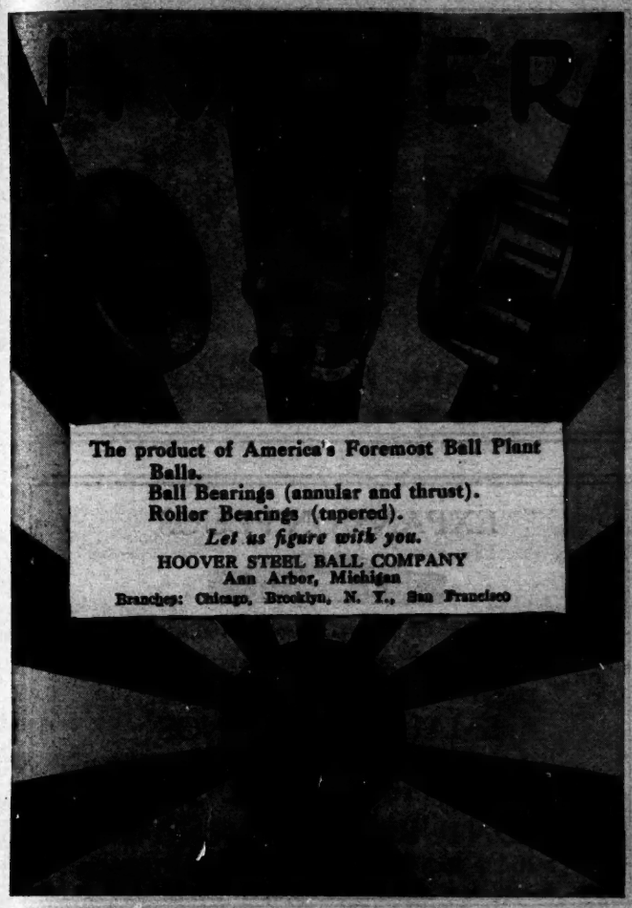
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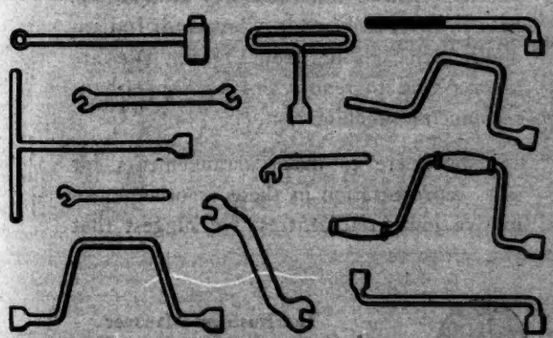
Apco Mossberg experience and equipment have solved many a manufacturer's problems. Put your wrench or stamping questions up to our engineering department.



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"IDEAL" Type L 1½ U ¼" HD Drill

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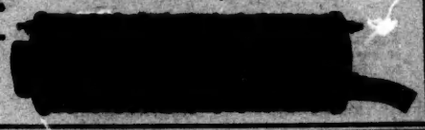

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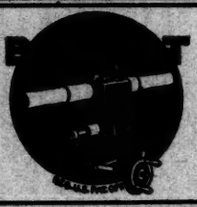
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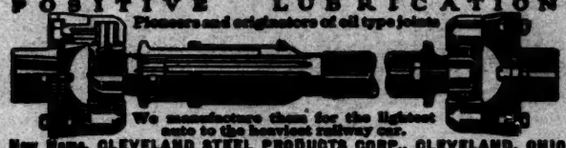
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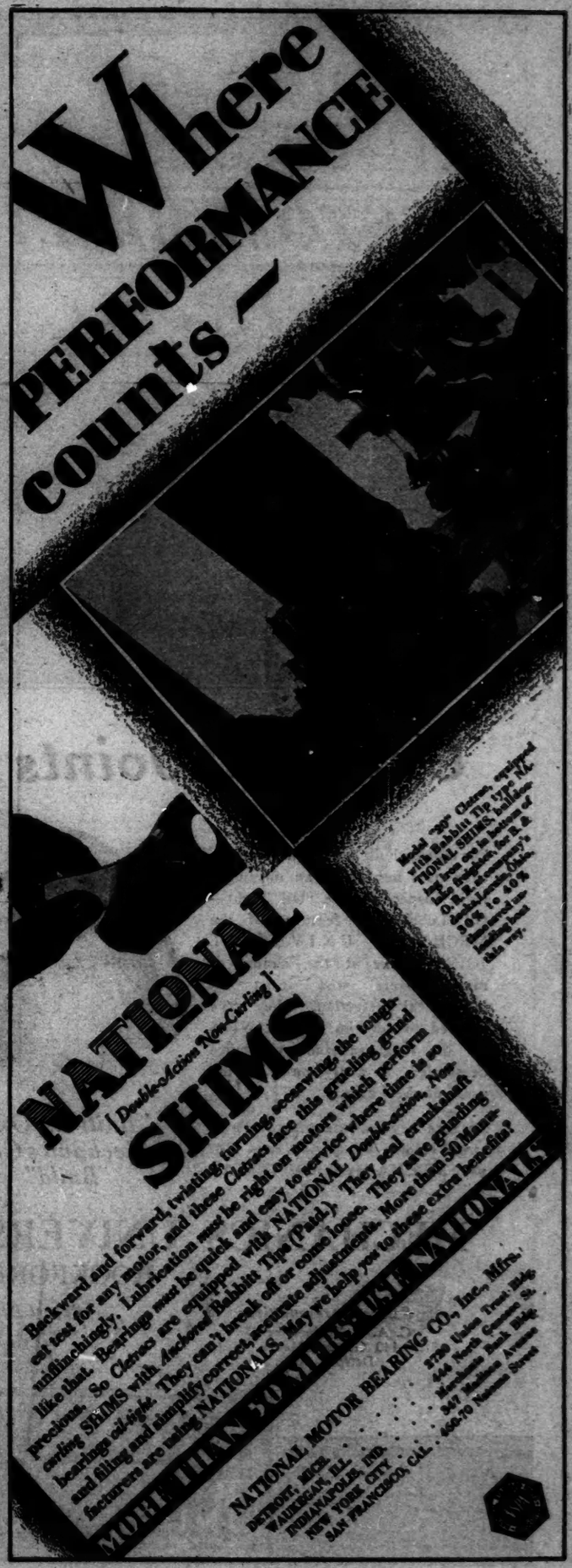
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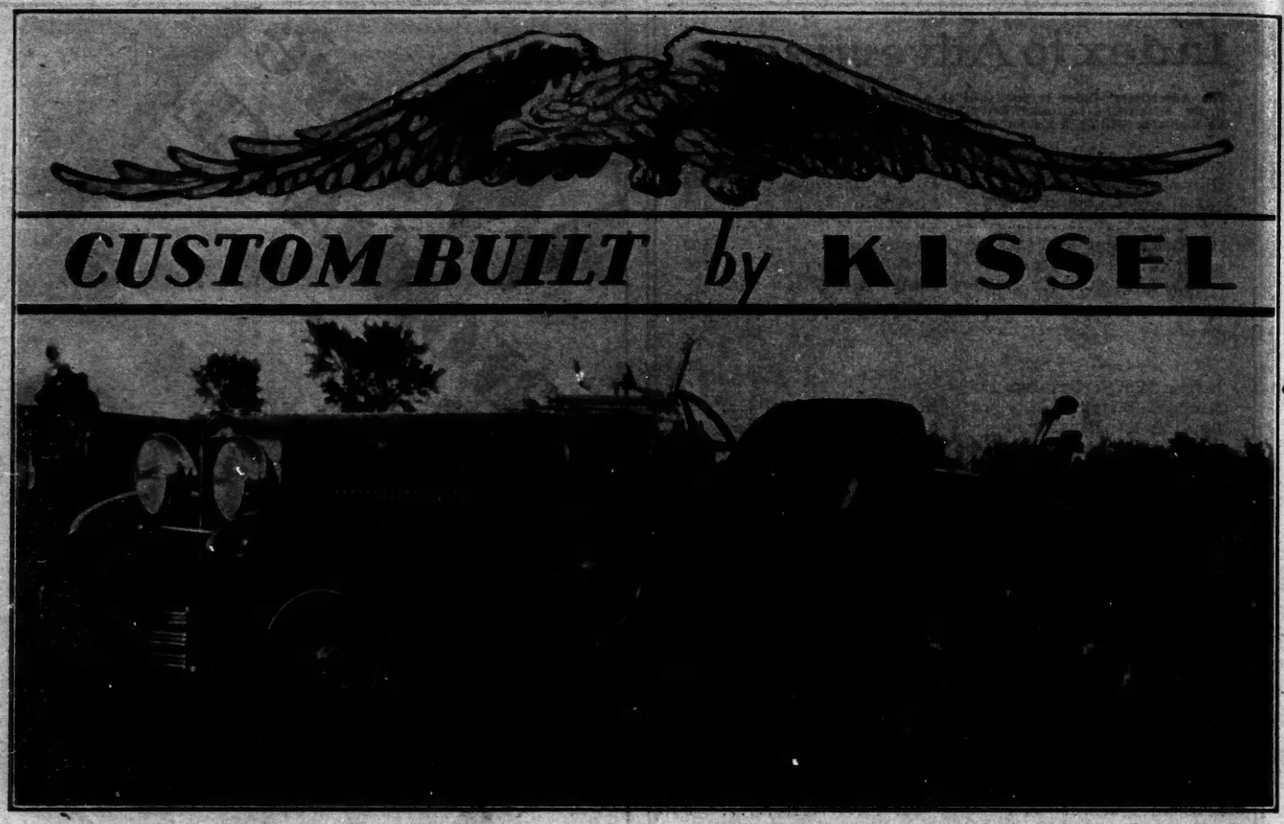

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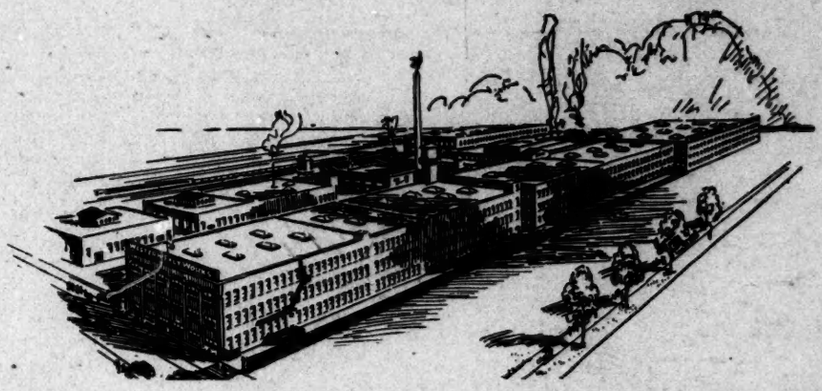

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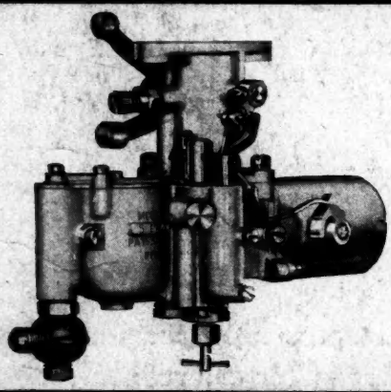

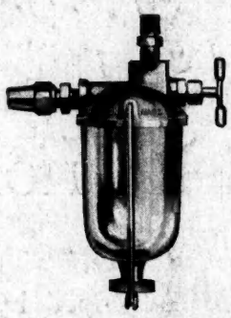

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